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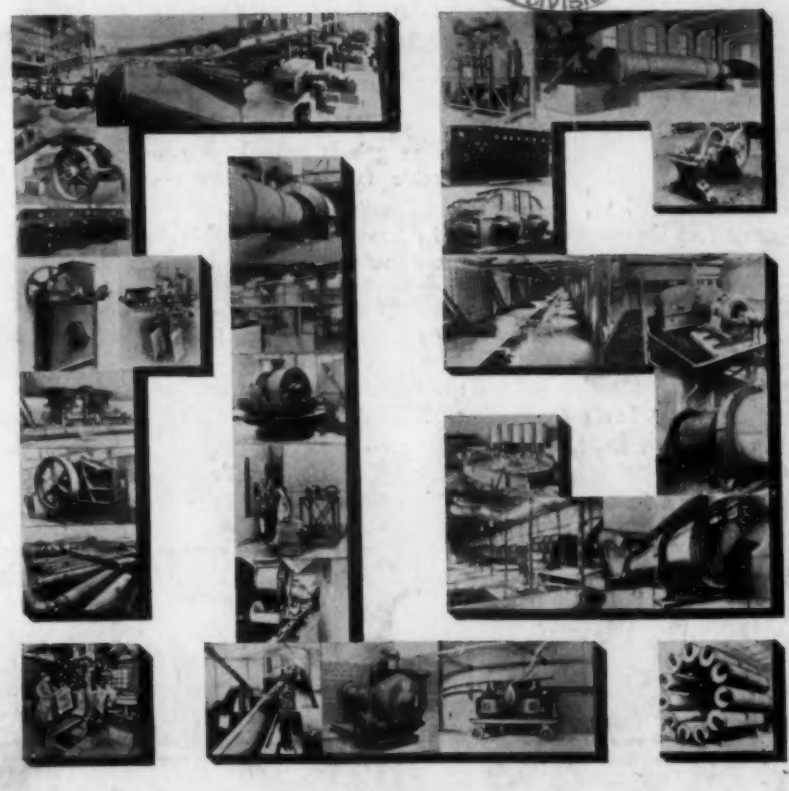

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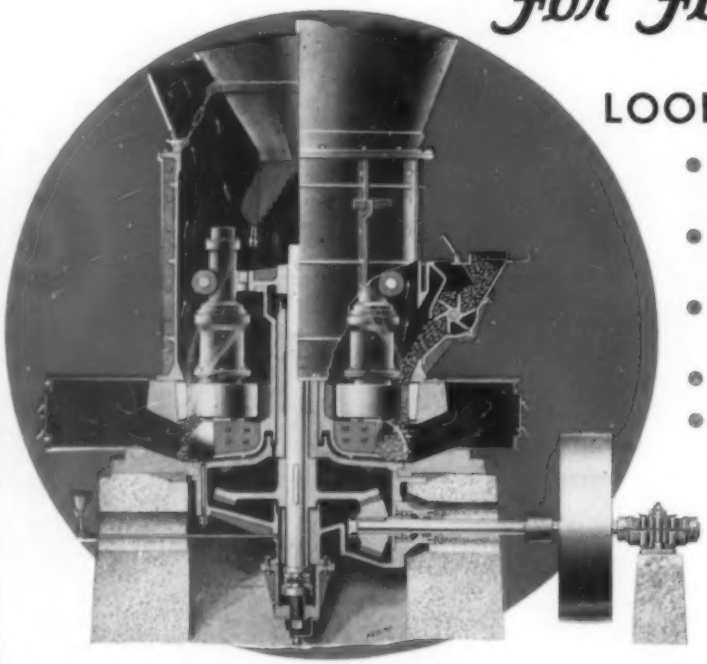

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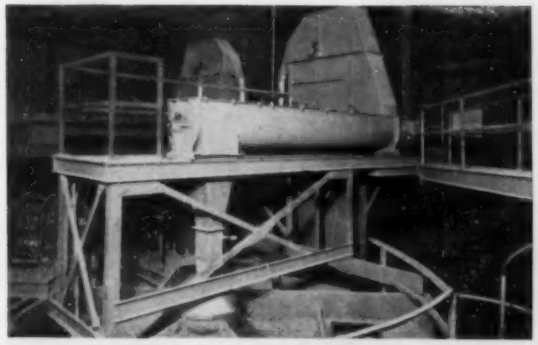

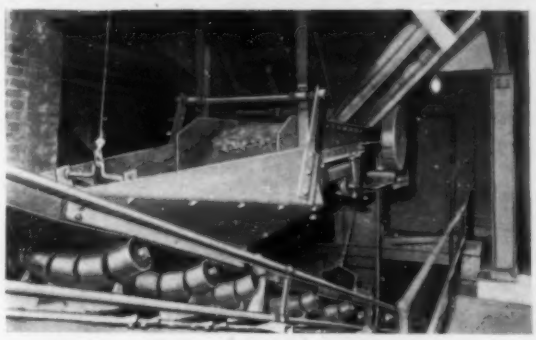

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RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

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RACE horses are expensive to own as well as to follow. An Ohio owner, not willing to trust his favorites to ordinary transportation, had a special motor van built. But the floor, even when made of 3-inch oak planks, was cut to splinters by the pawing hoofs of the high-strung animals. Matting was tried, but showed no improvement.

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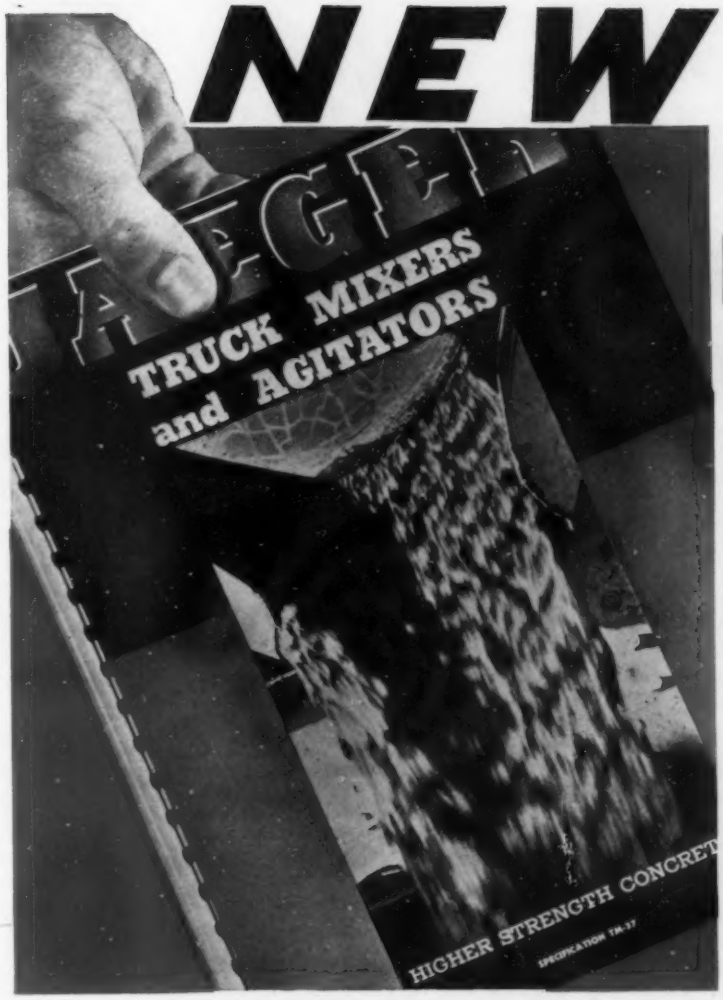

A Few of the Subjects Covered:

Essentials of Profitable Truck Mixer Operation
Reports of Leading Ready-Mix Operators
Maintenance Costs in Long Established Plants
Demonstrating and Selling Higher Strength Concrete
Low Cost, Efficient Plant Set-Ups
Factors That Speed the Payload Trip
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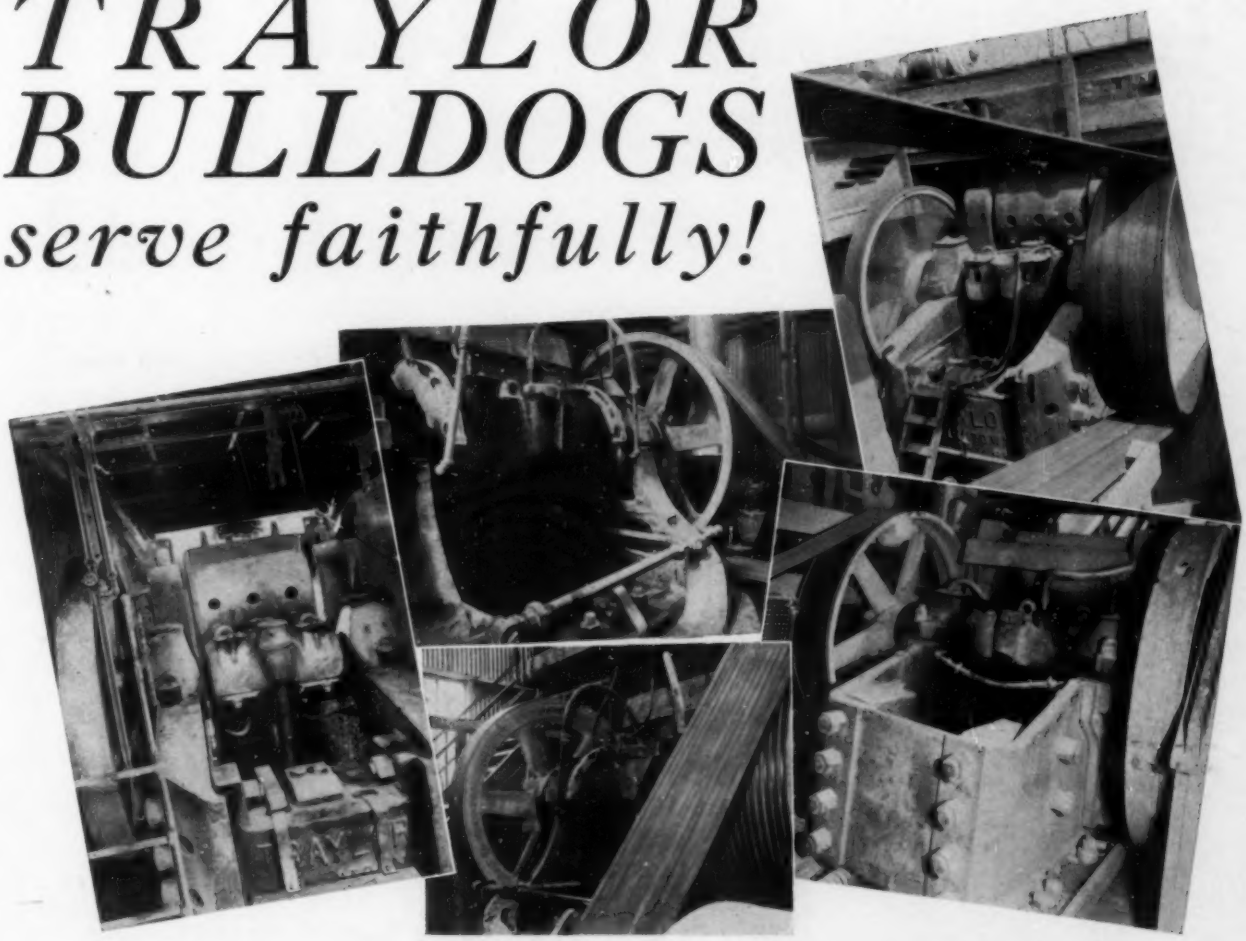

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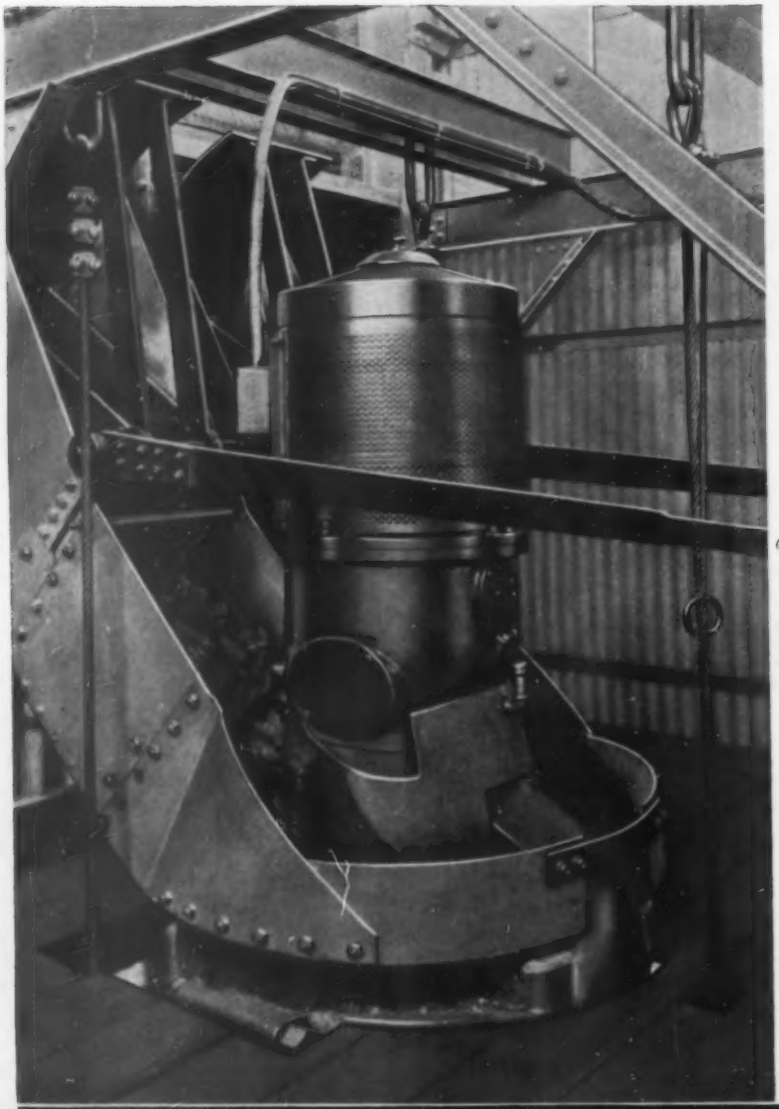

A PROMINENT Ohio commercial stone plant made the following tests on an Allis-Chalmers Newhouse Crusher, to prove to their own satisfaction that they had selected the best crusher for their job.

A test, which was of long duration was made on a 10″ Newhouse Crusher driven by a 125 hp, 495 rpm motor. The setting was 9/16″ on the close side with a ½″ throw eccentric. The maximum power input to the motor was 100 hp.

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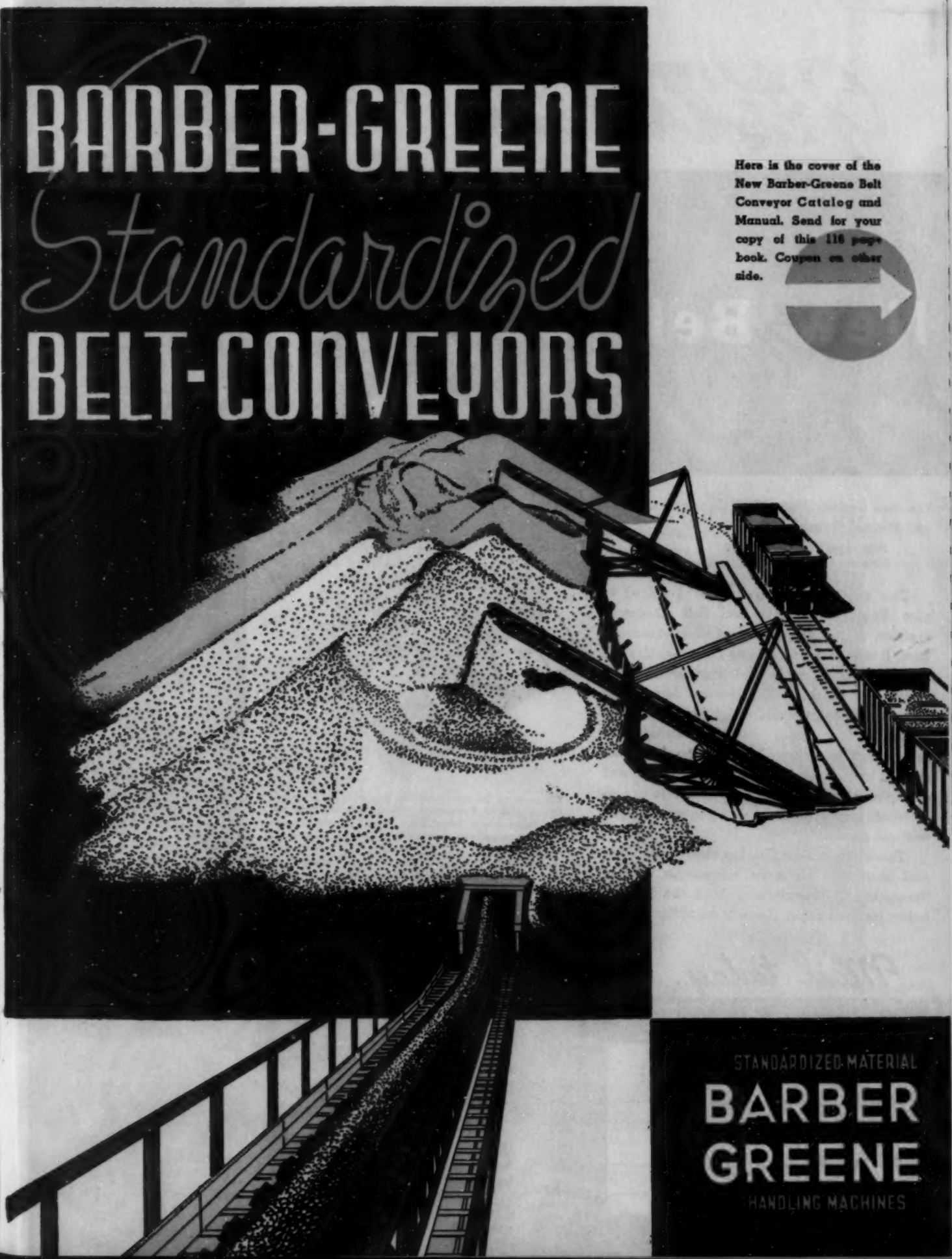

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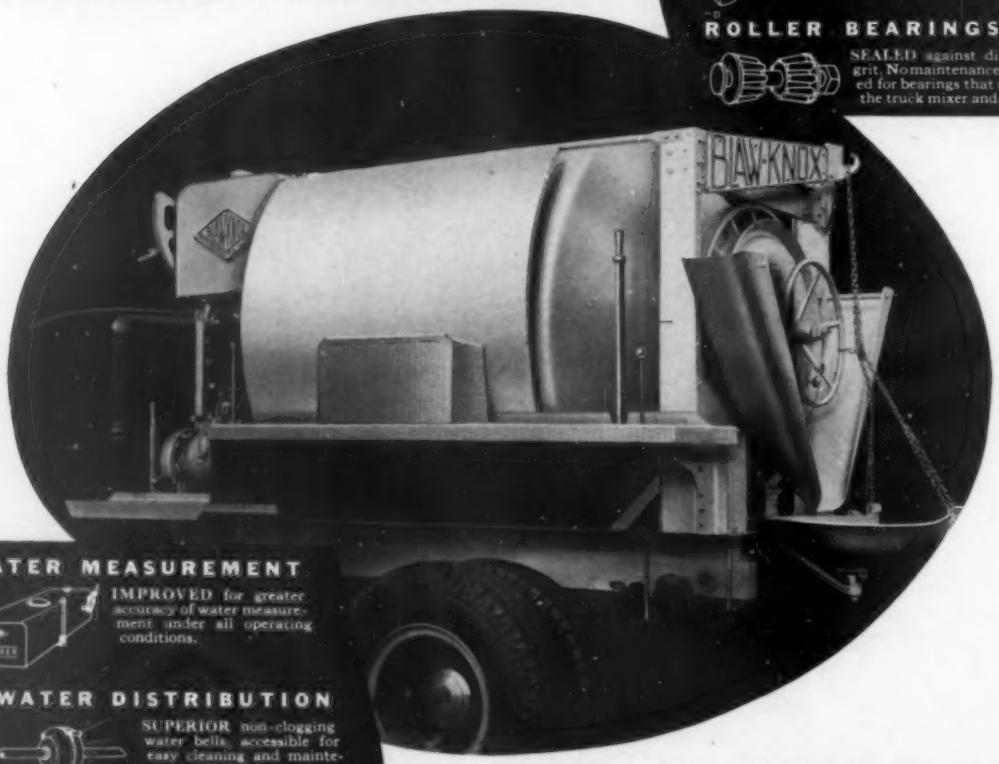

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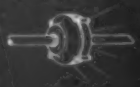

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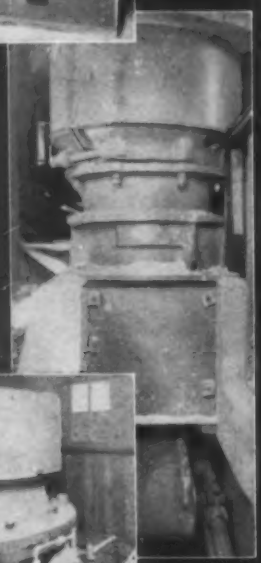

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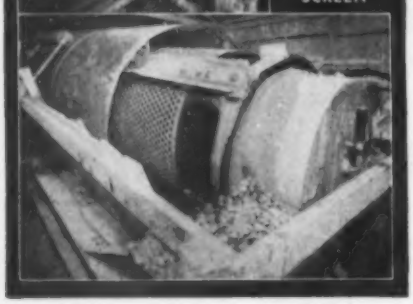


MEETS TODAY'S CONDITIONS

● In 1936, while most aggregate markets were over-produced, the Pioneer Fuel & Brick Co. of Butte, Montana, built a new gravel plant at Finlen, Mont. This completely modern plant was designed by Telsmith engineers to meet today's conditions. Each piece of Telsmith-built machinery is properly co-ordinated and balanced. The plant runs smoothly, efficiently *and profitably.*

Excavated material is delivered into the plant receiving hopper, equipped with a 16″x 5′ Telsmith Plate Feeder, and evenly discharged to an 18″x 66′ conveyor which takes it up to a 3 x 6′ Telsmith Double Deck Pulsator, used as a scalping screen. The screen's upper deck rejects the larger boulders to a Telsmith 8-B Primary Breaker; second deck rejects intermediate size to a Telsmith No. 32-B Reduction Crusher. All crushed material is returned to scalping screen for re-sizing before going to washing plant. Undersize passing the screen's lower deck goes to an 18″x 123′ Telsmith Belt Conveyor which discharges to a wash box. Water is added and raw material flumed to a 40″x 14′ Telsmith Ajax Rotary Washing Screen with blank and perforated washing sections, sand jacket, and gravel screening sections. Sand and water pass through the sand jacket and into a No. 5 Telsmith Sand Tank which separates coarse sand; overflow to a Telsmith No. 6 Sand Tank where fine sand is deposited. Each size of sand is discharged to a separate bin. Gravel is scrubbed, rinsed, sized and chuted to two separate bins. All storage bins are equipped with Telsmith Bin Gates.

Whether you are modernizing or planning a new gravel plant, write for Bulletin G-11 describing Telsmith engineering and equipment service.

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

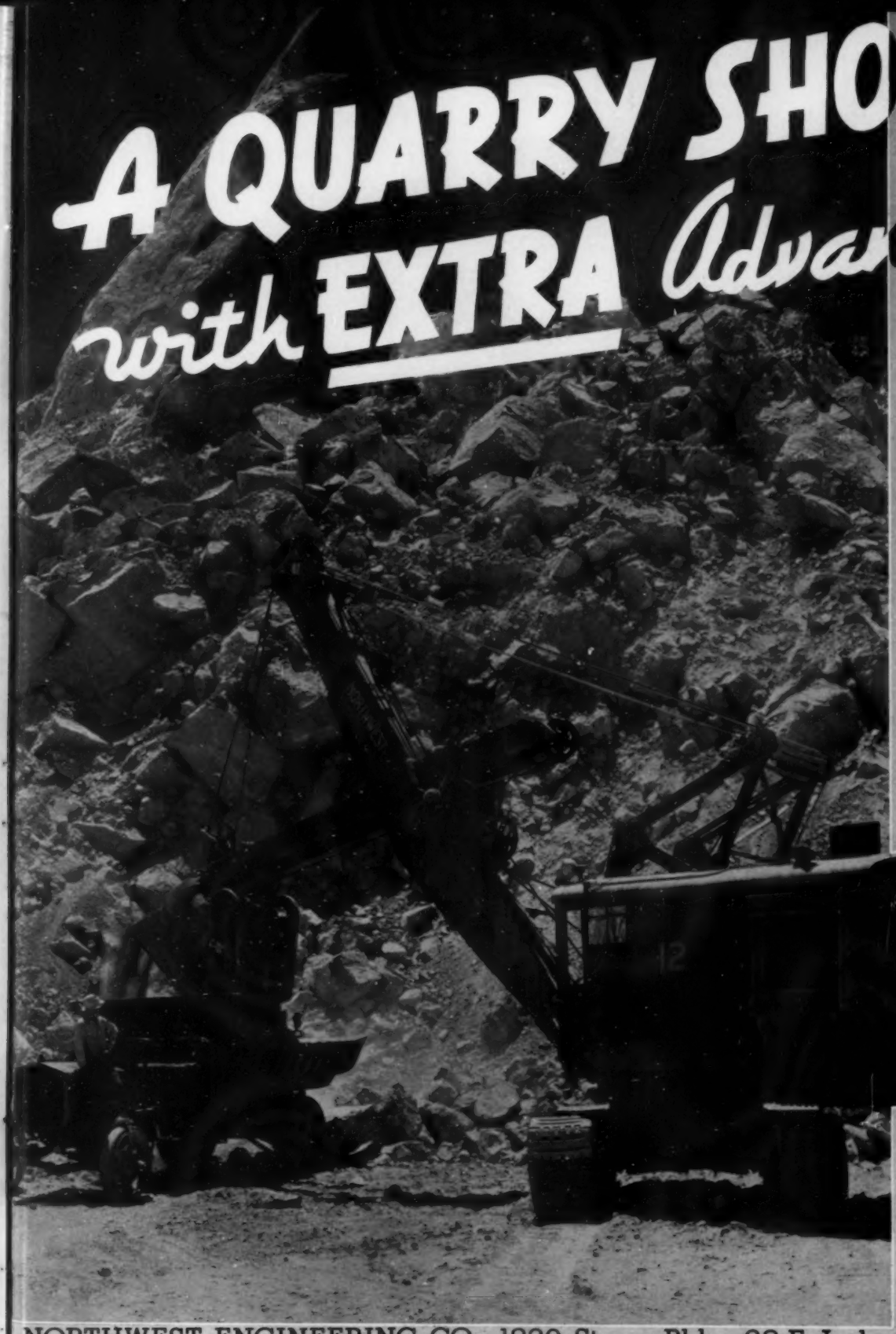
50 Church St. New York City | 201 N. Wells Chicago, Ill. | 1013 Commercial Trust Bldg. Philadelphia, Pa. | 81 Binney St. Cambridge, Mass.

412 Westinghouse Bldg. Pittsburgh, Pa. | Abrams-Anderson Co. Detroit, Mich. | Brandeis M. & S. Co. Louisville, Ky. | L. V. Fraley & Son St. Louis, Mo.

G-2

TELSMITH

A QUARRY SHOVEL with EXTRA Advantages!



LONG ago Northwests won their spurs as "Good Rock Shovels." They became the choice of contractors in the tough work of "pioneering."

They proved themselves in quarries and pits all over the country because they had quarry advantages that are exclusively Northwest.

The Northwest Independent Crowd brings you extra digging power through utilizing force that other shovels waste.

No Northwest Welded Boom has ever failed. Crawlers are flat and each tread has a roller support.

The "feather-touch" clutch control makes the handling of rock easier and increases output. The cushion clutch relieves strains on all parts under power, and increases machine life.

These are extra advantages that make Northwests better quarry shovels.

There is a size for every problem —⅜ cu. yd. capacity and larger.

GASOLINE • ELECTRIC • DIESEL • OIL

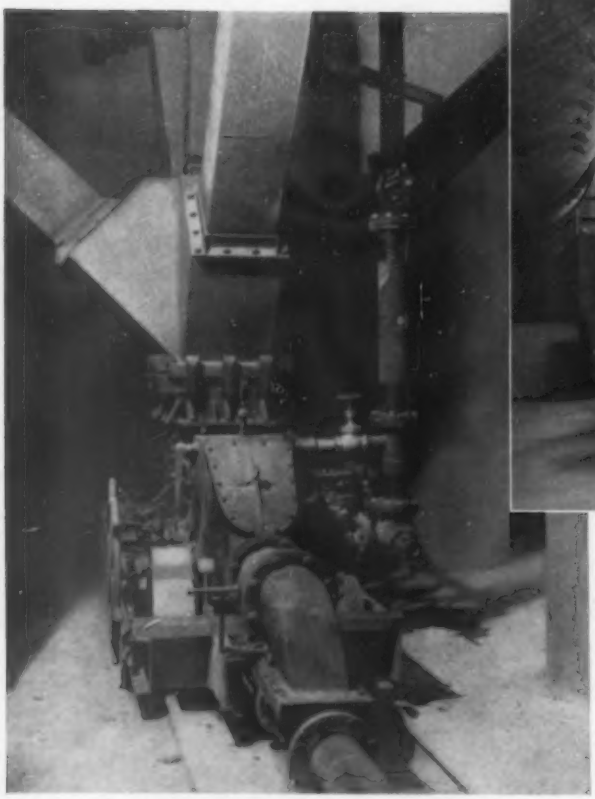
Built in a range of 18 SIZES ⅜ yd. capacity and Larger

NORTHWEST ENGINEERING CO., 1820 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

NORTHWEST

WORLD'S LARGEST EXCLUSIVE BUILDERS OF SHOVELS • CRANES • DRAGLINES

First IN CONVEYING PULVERIZED MATERIALS THROUGH PIPE LINES—FULLER-KINYON AND FLUXO PUMPS



Above—Fuller-Kinyon Type H Pump, one of 3 installed at the National Portland Cement Company, Brodhead, Pa., pumping cement from storage silos to packhouse.

Upper right—Fluxo Pumps, also installed at National Cement Company, pumping finished cement from tube mills to storage silos.

FOR many years the Fuller-Kinyon Conveying System has been recognized as the first in its field for transportation of pulverized materials.

This system of conveying through pipe lines is the result of years of extensive research and experimentation. Due to its economy and practicability it has been adopted as standard practice by the cement industry. It is also used almost exclusively for transporting cement on large construction projects.

Recognizing the merits and utility of the Fluxo Conveying System, the Fuller Company has also taken over the manufacture and sale of this equipment. It is especially adapted for long distance conveying... one installation at the present time is conveying cement through one continuous pipe line a distance of 6400 feet.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg. San Francisco: 320-321 Chancery Bldg.

P-7

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

Maximum Effective Performance *at Peak Load!*

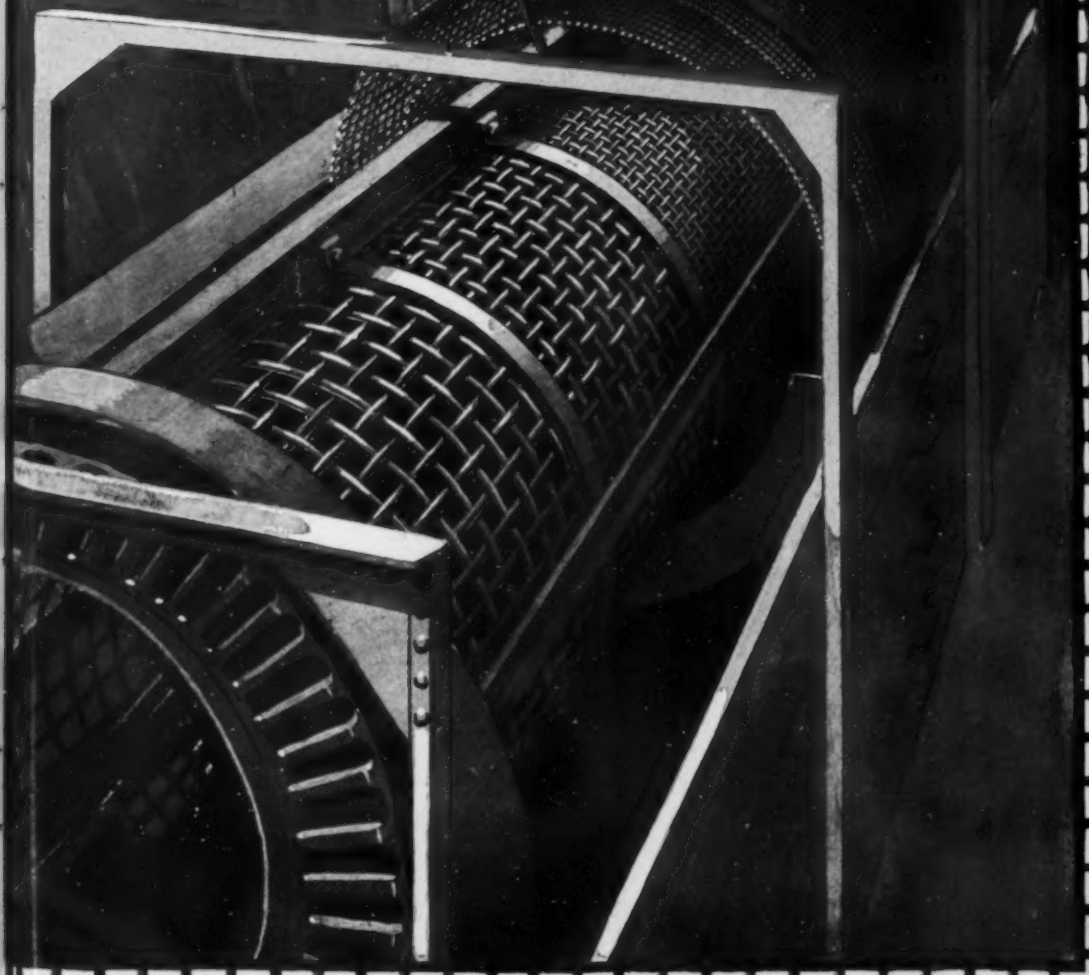
It's the peak load that proves the worth of Woven Screens.

It is then, with the crushing system crowded to the limit, that the extra capacity of Woven Screens pays big dividends.

Heavy square-mesh grizzlies or slot screens, ahead of the preliminary crusher, relieve the crushing system of a great amount of useless, wasteful work. With Woven Screens for scalping, the bins get ALL material of satisfactory sizes—the secondary crushers work only on the oversizes. Power wastes from useless conveying and recrushing are eliminated. Excessive fines and dust from useless cleavages are avoided. Both crushing costs and subsequent process steps reflect the efficient performance of the Woven Screens.

Positive Screen Control of both initial feed and circulating load is the basic principle of really economical crushing.

See the New Sta-Tru Long-Mesh Screen.
Full description and samples on request.



LUDLOW-SAYLOR WIRE CO.
600-616 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 48-W "Getting Results."

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The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS
600-616 S. NEWSTEAD AVE.

LUDLOW-SAYLOR WIRE CO.
600-616 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 48-W "Getting Results."

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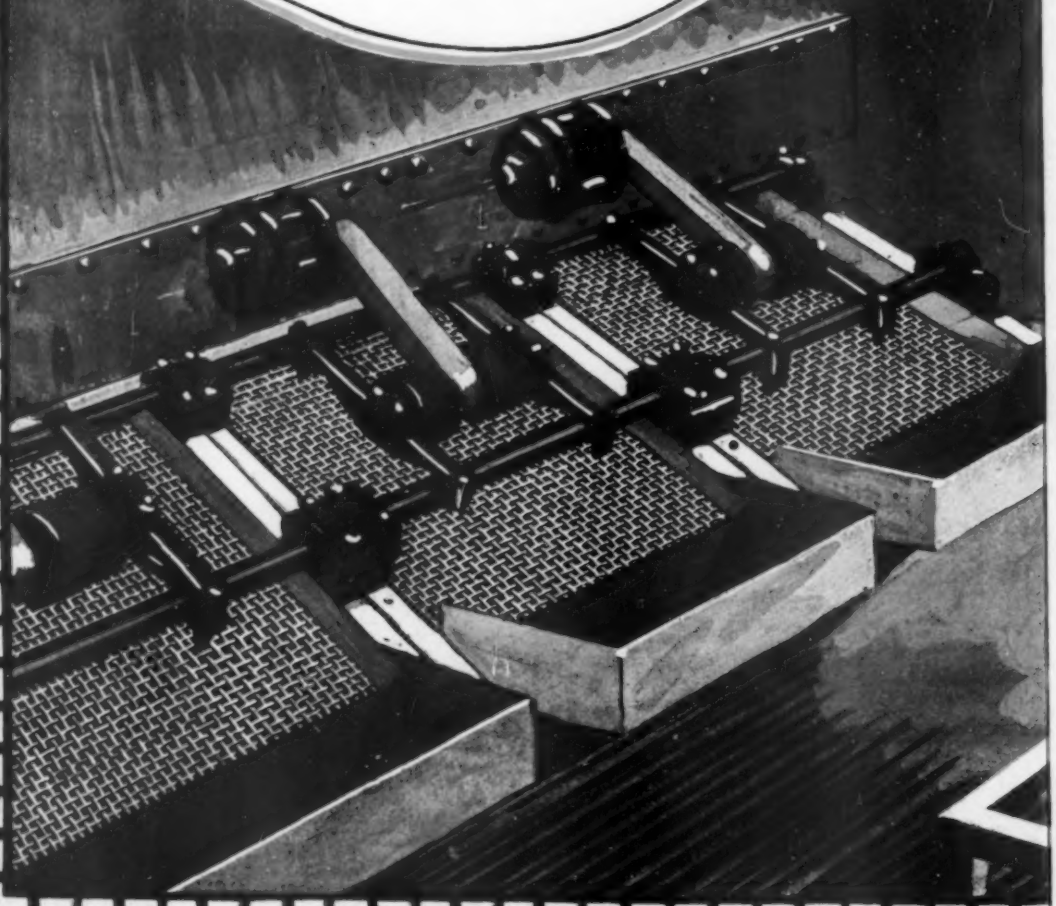
SQUARE MESH and LONG-SLOT

WOVEN WIRE SCREENS FOR ALL PURPOSES

See the New Sta-Tru Long-Mesh Screen. Full description and samples on request.



The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS

600-616 S. NEWSTEAD AVE.

Select the Rope that Fits Your Job

Protruding wires lap over adjacent wires as a wire rope passes over a sheave thus nicking the adjacent wires and causing rapid destruction of the rope. A broken outer wire in a preformed rope remains in its normal position. A broken outer wire in a non-preformed rope has a decided tendency to protrude. In cases where safety factors permit the continued use of a rope with a few broken wires, the additional service of the preformed rope after the first broken wires appear will in itself warrant the additional cost. Write us about your use of wire rope and we will gladly tell you whether or not preforming will save you money.

•

WICKWIRE SPENCER STEEL COMPANY, *General Offices:* 41 East 42nd Street, New York. *Sales Offices and Warehouses:* Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles; *Export Sales Dept.:* New York.

WICKWIRE SPENCER SALES CORPORATION, New York, Chattanooga, Tulsa, Portland, Seattle.

WIRE ROPE
by Wickwire Spencer

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York City

Please send me my free copy of your popular, new money saving manual, "Know Your Ropes".

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Firm_____

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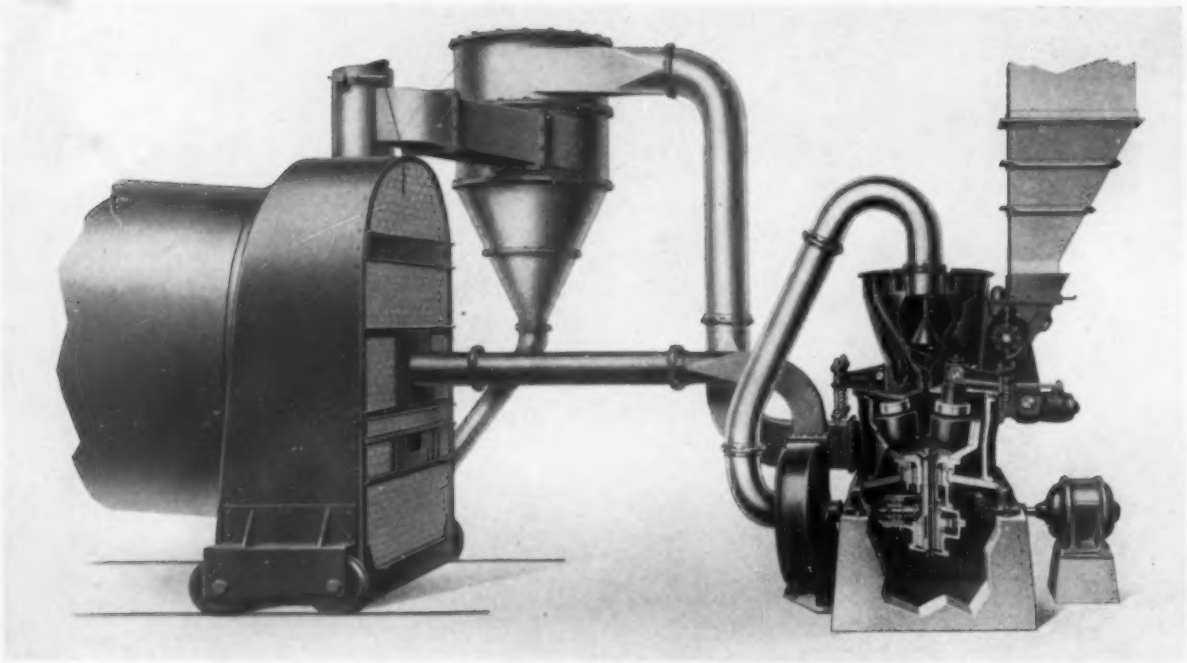


Bowl Mill firing FOR ROTARY KILNS

LOOK AT THE RECORD

48 Firing Kilns
158 Firing Boilers
206 Total Units in TWO YEARS

The success of the Raymond Bowl Mill is growing far and wide. Only a two-year-old, yet it has a veteran record of performance. The total number of installations in all industries has been averaging ten per month. Cement and lime plants have taken their share and are reporting sensational reductions in coal grinding costs. One after another, rotary kiln operators are converting their coal pulverizing equipment into the modern Bowl Mill type of direct-firing units. In all cases, they are taking advantage of the heat return from the kiln to dry the coal, as shown in the illustration. If you are interested in improving your kiln operations, check up these features of the Raymond Bowl Mill.

Efficient reduction on any grade of raw coal
Constant fineness over a wide capacity range
Instant response to load changes in firing
No metal-to-metal contact in pulverizing
Wear, vibration and noise reduced to minimum
Capable of continuous running for months
Simple adjustments and automatic lubrication
New low costs in operation and maintenance

RAYMOND BOWL MILL

Write for "Proof of Performance." Bulletin No. 29.

RAYMOND
Combustion Engineering Company, Inc.

PULVERIZER DIVISION
1307 North Branch Street, Chicago
Sales Offices in all Principal Cities
Canadian Representative: Combustion Engineering Corporation, Ltd., Montreal

WHY 213 ?

STURTEVANT AIR SEPARATORS IN CEMENT PLANTS

ALL SOLD ON TRIAL — NOT ONE REJECTED

BECAUSE

THEY ARE PROVEN GUARANTEES OF

INCREASED CAPACITIES
FINENESS—SURFACE AREAS

AND ASSURANCE OF

PRESENT-DAY DIFFICULT CEMENT SPECIFICATIONS

Mills alone cannot do this profitably but Sturtevant's Separators do control mill products to meet any present requirements.

MORE THAN DOUBLE THIS NUMBER IN OTHER INDUSTRIES

producing products ranging from 50 mesh to 400 mesh, handling circulating loads from 1000 pounds up to 750 tons per hour. With most products between 50 and 400 mesh they have very definitely displaced screens. Every plant is different. Each has its problems—Tell us yours, it costs you nothing and may prove as profitable to you as it has to others.

STURTEVANT MILL CO., DORCHESTER, BOSTON, MASS.

GAYCO

CENTRIFUGAL AIR SEPARATOR

This new unit is deserving of the serious consideration of every operator interested in the increased capacity of all types of grinding mills.

The new GAYCO Centrifugal Air Separator will separate practically all dry fine materials including many that are too sticky to be screened.

The principle of rejecting the coarse particles by means of an adjustable centrifugal sizing fan is an exclusive GAYCO feature.

We also manufacture Bucket Elevators — Bin Gates—Belt Conveyors—Feeders—Grizzlies—Rock Crushers—Revolving Screens and furnish complete crushing, screening and washing plants for crushed stone or sand and gravel.

Let our engineers give you the benefit of their many years' experience. Ask them how the GAYCO Centrifugal Air Separator can pay for itself in your plant.

Universal Road Machinery Co.

MAIN OFFICE AND FACTORY
KINGSTON, N. Y.

LABORATORY
KINGSTON, N. Y.

GAYCO

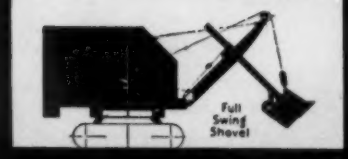
RUBERT M. GAY - DIVISION
114 LIBERTY STREET
NEW YORK, N. Y., U. S. A.

GAYCO

"GAYCO" CENTRIFUGAL SEPARATORS

"RELIANCE" CRUSHING, SCREENING AND WASHING EQUIPMENT

Now you can say "Good-Bye" to SLOW-MOTION SHOVELS



Parts shown above in black represent the mass moved on every swing. With ample power and minimum "dead weight" the Badger makes more swings per hour.

A-W 1/2 cu. yd. Badger OUTPERFORMS because it Starts—Stops—Swings faster

YOU'LL get new low production costs when you put an A-W Badger to work in the place of a slow-motion shovel.

The A-W Badger has brilliant, flashing performance—stops—starts—swings faster—for the stronger, lighter weight swinging structure avoids inertia at the start and momentum on the end of a swing. It can—*and does* outperform.

Scientific weight distribution and low center of gravity holds it steady in hard going. No tail swing—works in "tight" places. Plenty of reach, and abundance of power.

Send today for literature.

AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

Austin-Western

The Austin-Western Road Mach. Co., V. Aurora, Ill.

☐ Send a salesman
Tell me more about the

☐ Badger Shovel	☐ Crushing & Washing Plants
☐ Motor Grader	☐ Elevating Graders
☐ Roll-A-Plane	☐ 5 Yd. Scraper
☐ Blade Grader	☐ 12 Yd. Scraper
☐ Motor Sweeper	☐ Bituminous Distributors
☐ Trail Cars	

SH734

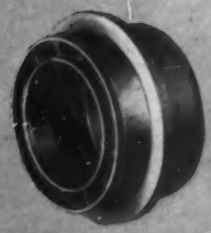
Name _____

Address _____

City _____ State _____

How the DA-35 was achieved

"A WORLD BEATING COMBINATION"
The DA-35 with Auto-feed and Jackbits



The DA-35
Double-opening Valve

WE told our designers, metallurgist, manufacturing experts — "Build a BETTER, faster drill in the 150-lb. weight class. Forget everything but more drilling speed per pound of drill and less air per foot drilled—but don't sacrifice easy handling, durability or low upkeep . . . We want RESULTS!"

EXPERIENCE

Into the creation of DA-35 went the Company's 65 years cumulative designing and manufacturing experience, together with the modern knowledge of I-R drill men and engineers the world over.

NEW VALVING

An entirely new, double-opening, direct flow valve largely explains the phenomenal speed and low air consumption of the DA-35.

The double-opening feature provides quicker and larger openings. It permits the use of a small-diameter, light-weight valve with short travel. Friction losses are reduced. More power is squeezed out of the air used. Valve life is prolonged.

NEW MATERIALS

The result of our efforts was this—the speed and power of a 180-lb. drill condensed into a 150-lb. machine! Naturally in doing this we needed new alloys and materials not heretofore used in rock drills. We used them and got what we wanted.

MORE EXPENSIVE MANUFACTURE

This drill cost us a lot more to produce—new methods of fabrication and heat treatment in addition to the new materials—but you'll agree with us that it was worth it. First cost is of minor importance. Cost per foot of hole drilled is what counts—and you get it down to rock bottom with DA-35.

11 BROADWAY **Ingersoll-Rand** NEW YORK CITY

The DA-35 will give you more drill hole at a lower cost per foot 485-5

We lubricate EACH WIRE
TO INSURE LONG LIFE

AMERICAN TIGER BRAND WIRE ROPE

American Tiger Brand Wire Rope
Electrical Wires & Cables
Amerclad All-Rubber Cables
Aerial Tramways
Tiger Wire Rope Slings
Tiger Wire Rope Clips

LUBRICATION at each point of contact in wire rope is of equal importance to that in any complicated machines*. It reduces external wear, prevents corrosion, cuts down internal friction and enables each strand to move freely — all of which results in increased useful life.

Every wire of American Tiger Brand Wire Rope is carefully lubricated. This adds vitally to the flexibility of the rope, enabling it to withstand the terrific jerks of starting and stopping.

This lubrication is the result of years of engineering and field experience and is but one of the many different features which make American Tiger Brand Wire Rope a profitable operating investment for you.

American Tiger Brand Wire Rope is available in either Standard (non-preformed) or Excellay (preformed) constructions.

* Machines? Absolutely, wire rope is a machine. It fits perfectly the dictionary definition, "Any combination of mechanism for utilizing or applying power."

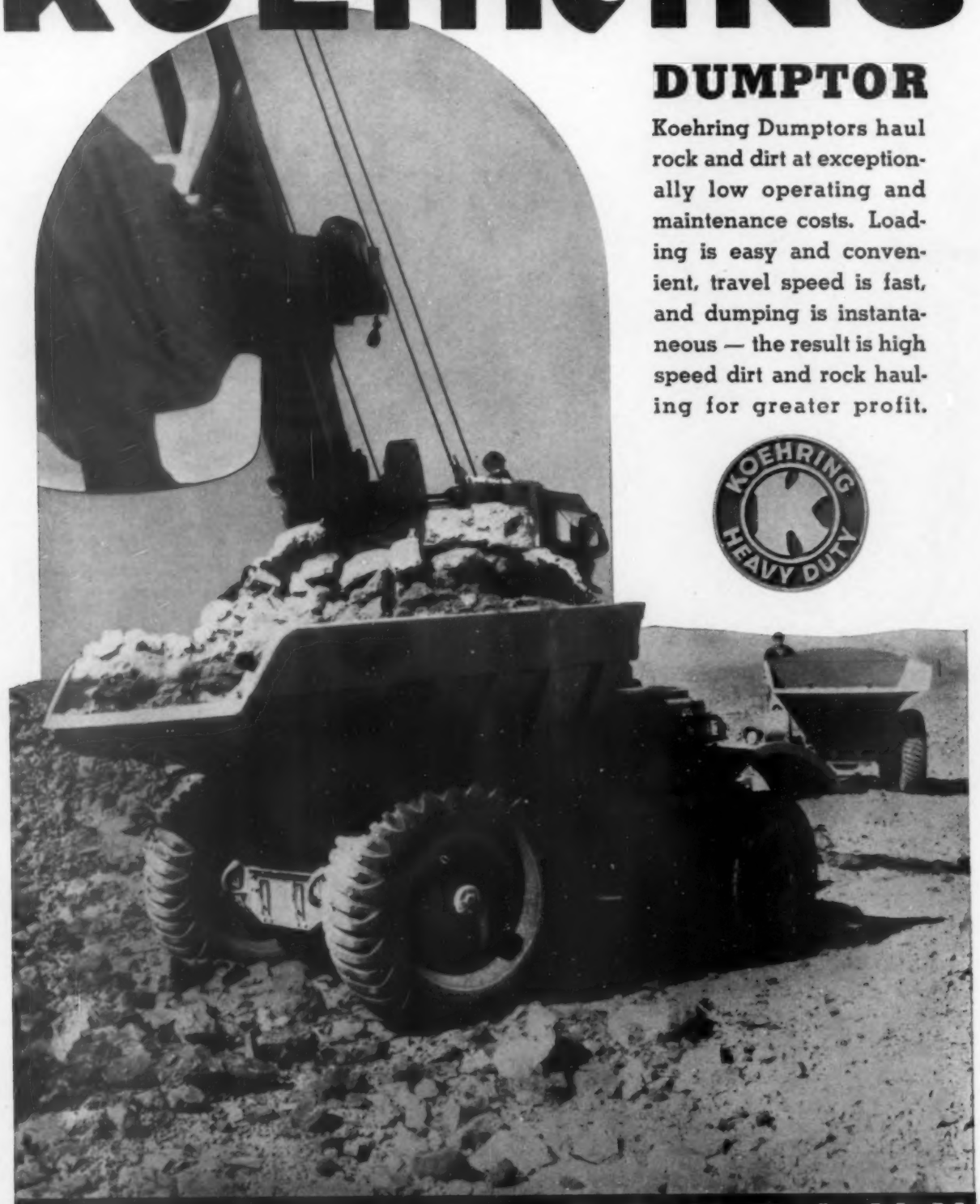
AMERICAN STEEL & WIRE COMPANY
208 South La Salle Street, Chicago · Empire State Building, New York
COLUMBIA STEEL COMPANY
Russ Building, San Francisco
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

KOEHRING

DUMPTOR

Koehring Dumptors haul rock and dirt at exceptionally low operating and maintenance costs. Loading is easy and convenient, travel speed is fast, and dumping is instantaneous — the result is high speed dirt and rock hauling for greater profit.



KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

Fighting "SMOG"

WITH U·S·S COPPER STEEL SHEETS

PERHAPS you don't know what "smog" is. Well, smog is industrial smoke and foggy weather . . . a mixture of chemical wastes and water droplets.

Sounds bad, doesn't it? "Smog" is attacking the structures shown in this picture. Therefore, they were built to last . . . of USS Copper Steel Galvanized Roofing and Siding.

Here are miles of steel sheets taking the punishment of man-made smoke plus the normal pranks of Nature . . . fog, rain, sleet, hail. USS Copper Steel can endure because it is well made. Every sheet is uniform . . . contains the proper proportions of copper and steel . . . is strong and durable.

Why don't you take a "tip" from the men who planned this coal company's bridge and incline conveyors, tipple and washery buildings?

Why don't you buy USS Copper Steel Black and Galvanized Roofing Sheets? Communicate with our engineers, who have studied atmospheric corrosion and how to fight it with USS Copper Steel . . . A little copper goes a long way.

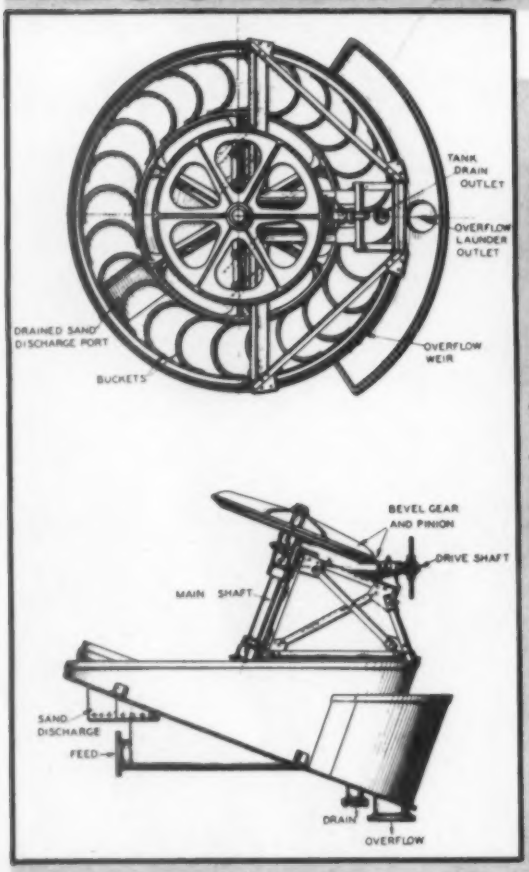
U·S·S BLACK *and* GALVANIZED SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION · *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY · *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY · *Birmingham*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

RECOVER YOUR STONE SAND



with a

DORRCO SAND WASHER

SIMPLE •
A revolving ring of buckets, operating over a sloping deck.

COMPACT •
A single, self-contained unit — easily erected and easily trucked from one location to another.

SLOW MOVING •
Only 2 to 3 RPM on the main shaft; 15-17 RPM on the pinion shaft.

HIGH CAPACITY •
Up to 150 tons per hour on standard units; up to 300 tons on special ones.

LOW POWER •
From 3 to 10 connected horsepower, depending on size.

LOW MAINTENANCE •
Buckets alone subject to appreciable wear and these are readily replaceable.

DORRCO SAND WASHER SIZES

Size	Capacity
7 ft. dia.	20-40 tons per hr.
9 ft. dia.	40-80 tons per hr.
12 ft. dia.	80-150 tons per hr.

DORRCO

Have you seen our bulletin "Are You Getting Clean Sand?"

WRITE TO OUR NEAREST OFFICE FOR FURTHER INFORMATION

THE DORR COMPANY INC.

ENGINEERS • 570 Lexington Ave., New York

CHICAGO • TORONTO • DENVER • LOS ANGELES • ATLANTA

DORR TECHNICAL SERVICES AND EQUIPMENT ARE AVAILABLE FROM THE FOLLOWING COMPANIES:

HOLLAND: Dorr-Oliver N. V., The Hague
FRANCE: Soc. Dorr-Oliver, Paris
GERMANY: Dorr Gesellschaft, m. b. H. Berlin
ENGLAND: Dorr-Oliver Company Ltd., London
AUSTRALIA: Crossle & Duff Pty. Ltd., Melbourne
SOUTH AFRICA: Edward L. Bateman Pty. Ltd., Johannesburg
JAPAN: Sanki Engineering Co., Ltd., Tokyo
ARGENTINA: Luis Fiore, Buenos Aires
BRAZIL: Oscar Taves & Co., Rio de Janeiro

WHY REX?

this tells the whole story

It is typical. Rex design, Rex construction, plus Rex service have convinced this user as it has hundreds of others that Rex Moto-Mixers and Agitators are the finest on the market.

This Wire is Just One of the Many Received from Enthusiastic Users of Rex Moto-Mixers and Agitators

BY DIRECT WIRE FROM

WESTERN UNION

NEWCOMB CARLTON, CHAIRMAN OF THE BOARD — J. C. WILLEVER, FIRST VICE-PRESIDENT — R. B. WHITE, PRESIDENT

1223-S

SYMBOLS
DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

This is a full-rate Telegram or Cable-gram unless its deferred character is indicated by a suitable symbol above or preceding the address.

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination.

AU067 179 NL 1/121 TDWS MAMARONECK NY MAR 2

CHAIN BELT CO-

WE ARE GLAD TO INFORM YOU THAT WE HAPPEN TO BE THE PROUD OWNERS OF EIGHT FOUR YARD REX MOTO MIXERS STOP IN THE SPRING OF NINETEEN THIRTY FIVE WE PURCHASED THREE REX UNITS AND THREE OF ANOTHER MAKE STOP WE LATER DISPOSED OF THE OTHER MACHINES AND REPLACED THEM WITH REX STOP THE REX GAVE US SUCH SATISFACTION IN THE PAST THAT WE PURCHASED TWO ADDITIONAL REX MOTO MIXERS EARLY THIS YEAR AND WE ARE ENTIRELY SATISFIED WITH THEM STOP TO DATE WE HAVE NOT SPENT OVER FIVE DOLLARS FOR PARTS ON ALL OUR REX MACHINES STOP DURING THE PAST TWO SEASONS OUR REX UNITS HAVE HANDLED OVER FORTY ONE THOUSAND YARDS OF CONCRETE AND WE FEEL THAT THEY ARE PRACTICALLY IN AS GOOD CONDITION AS THE DAY WE PURCHASED THEM STOP WE THOUGHT SO MUCH OF THE REX MACHINES THAT WE HAVE JUST ORDERED TWO ADDITIONAL FOUR YARD UNITS FOR DELIVERY THIS FALL STOP ABOVE ALL WE FIND THE CHAIN BELT COMPANY TO BE THE FINEST AND MOST RELIABLE CONCERN THAT WE HAVE EVER DONE BUSINESS WITH

THE GENERAL SAND STONE CORPN. 950A MAR 3

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

If you are interested in lowering concrete handling costs or in getting your share from the rapidly rising market for ready-mixed concrete, you want this book. "Rex Moto-Mixers and Agitators" tells all about the modern Rex way to higher profits. Send for it today.

CHAIN BELT COMPANY
1649 W. Bruce St., Milwaukee, Wis.

REX

THE UP-TO-DATE METHOD OF HANDLING CONCRETE

MOTO-MIXERS

CHAIN BELT COMPANY of Milwaukee

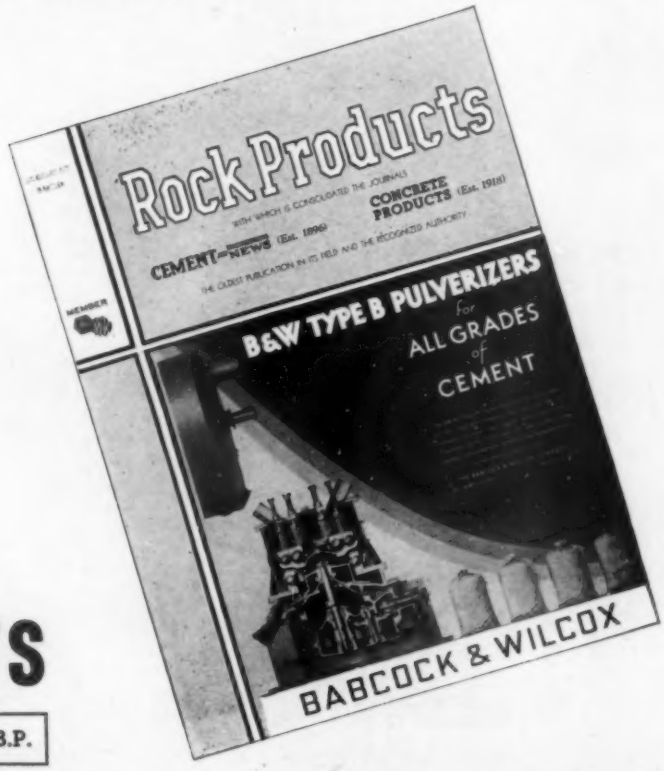
LET SALES REACH A NEW HIGH

This Year

In the rock products industry sales of equipment required in meeting increasing production demands, are sending the manufacturers' profit curve decidedly upward.

Both private and publicly financed construction contracts have shown a gain each month this year over the preceding month and over the same period last year. These increases assure buying activity by the rock products industry. A vast amount of money will be spent for new equipment.

ROCK PRODUCTS reaches the key men of this live, prosperous industry. These men represent 92% of the purchasing power of the rock products market. They are buying equipment right now—for summer and fall production demands—equipment they see advertised in ROCK PRODUCTS.

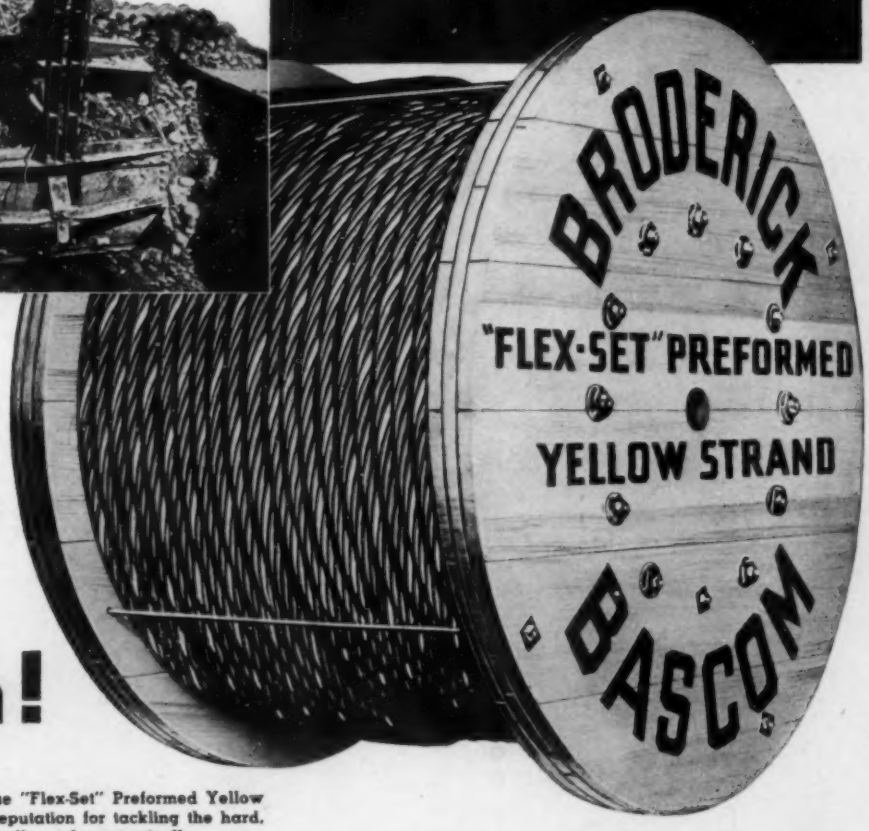


ROCK PRODUCTS

205 W. WACKER DRIVE
CHICAGO, ILLINOIS

A.B.C. and A.B.P.

"Flex-Set" Preformed YELLOW STRAND



It's Tough!

Yes, tough is the word—because "Flex-Set" Preformed Yellow Strand has a well established reputation for tackling the hard, grilling jobs, and doing them well—and economically.

The same specially drawn wire is used that put Yellow Strand wire rope at the very top years ago. It still must pass searching tests in the B & B laboratory. But now the wires are pre-shaped to the helical form they occupy permanently in the finished rope.

And what is the result? *Longer life* — because the rope is practically pre-broken in, rotation on shafts and drums is greatly reduced, and there is remarkable resistance to kinking and fatigue.

Where the job is tough — on power shovels, dragline machines, derricks, excavators—let a tough rope do the work. That's "Flex-Set" Preformed Yellow Strand.

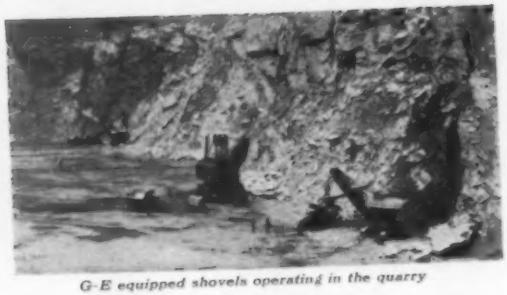
Broderick & Bascom Rope Co., St. Louis

Factories: St. Louis, Seattle, Peoria

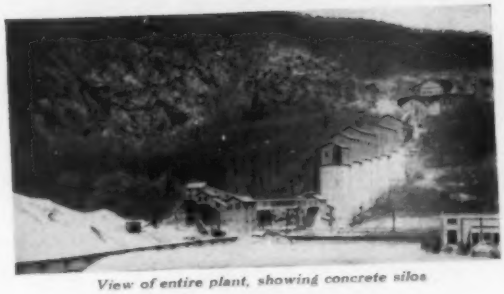
Branches: New York, Chicago, Seattle, Portland, Houston

U-15R3

Hudson River Stone Corp. *with* Dependable



G-E equipped shovels operating in the quarry



View of entire plant, showing concrete silos

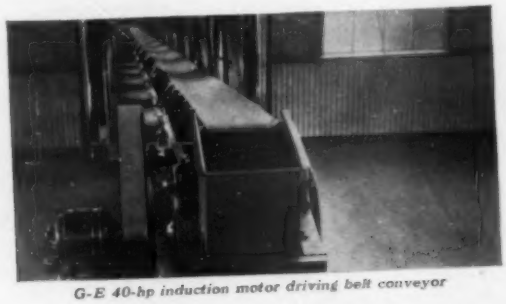
MOVING a mountain to a river well describes the operations at the plant of the Hudson River Stone Corporation at Cold Spring, N. Y. Through modern production methods, in which the dependability of G-E equipment is an important factor, it is possible to quarry stone high up on a mountain overlooking the Hudson River and start it immediately through processes that continue to the bank of the river.

OPERATION IS PRACTICALLY CONTINUOUS

In this large, modern crushed-stone plant, which is electrified throughout and has a daily capacity of 2000 tons, operation is practically continuous. The rocks blasted in the quarry are picked up with G-E equipped shovels, placed in trucks, and carried to the primary-crushing building. There they are started through the crushing, washing, and screening processes that reduce them from great blocks to the sizes desired.

The entire operation is unified by electrically interlocked conveyors that connect one process to the next and distribute the product

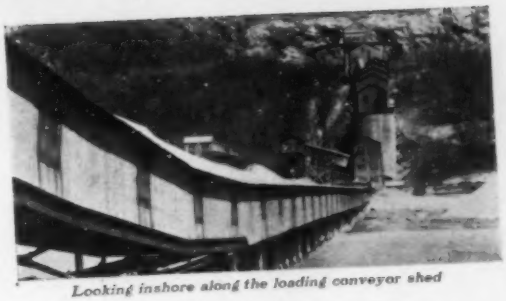
G-E 450-kw Diesel-engine-driven generators in power station supply power for entire plant



G-E 40-hp induction motor driving belt conveyor

GENERAL

Moves Mountain to River
G-E Equipment



Looking inshore along the loading conveyor shed

Loading operations at the dock

to the concrete storage silos or to barges, railroad cars, or trucks.

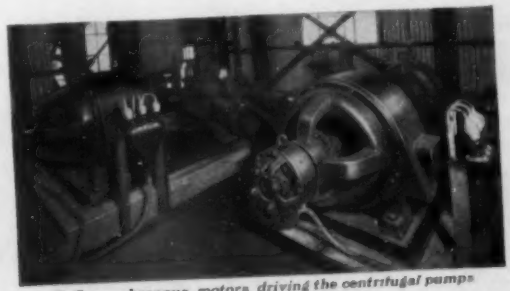
MOTORS SUITED TO THEIR JOBS

G-E motors drive the crushers, screens, conveyors, and pumps. Because each is exactly suited to its particular application and is operated by G-E matched control, it gives the most efficient, reliable performance possible. The sturdy construction and careful design of these motors enable them to withstand dust and vibration. Engineers at the plant say that these motors, during the several years they have been in operation, have given no trouble at all.

G-E Diesel-engine-driven generators are a reliable and economical source of power; and G-E transformers throughout the plant are further aids to low-cost, efficient operation.

Installations such as this show the advantages that G-E equipment can give you in *your* rock-products plant. Call the nearest G-E representative for further information. General Electric, Schenectady, N. Y.

G-E switchboard in power station



G-E synchronous motors driving the centrifugal pumps that supply water for washing operations

Notes on our trip to the Hudson River Stone plant

ELECTRIC

Smartly run departments and projects never let up in their hunt for lower operating costs. They seek out savings everywhere. That's why more and more plants switch to HEWITT industrial rubber goods each year . . . and then stick to specifying them. Every HEWITT product is made with an eye to lowering YOUR operating costs. The longer life that HEWITT builds in, the ceaseless search for improved construction, the unending developments that lead to greater standing, all are directed toward that goal. HEWITT Maltese Cross *asbestos construction* Steam Hose, for example, cuts operating costs to bed rock. There are HEWITT distributors located near your plant. They will welcome an opportunity to discuss HEWITT industrial rubber goods on the solid basis of dollars and cents performance. They are listed in the classified telephone directory of industrial centers under "Rubber Goods" or "Belting".

HEWITT

RUBBER CORPORATION BUFFALO N.Y.

HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING

Rock Products

Vol. 40 Chicago, July, 1937 No. 7

Needed "Ism"—Americanism

Comments by
. The Editor .

The President, his lady secretary of labor, and Mr. John L. Lewis face a rising tide of public resentment—not confined to the "economic royalist" group. The reason is not far to seek, for regardless of sentiment or political faith of his retainers, a man in public office cannot long retain their respect and admiration if he allows the office itself to be degraded. In the opinion of a host of his former admirers and believers the President has degraded his office by accepting insults from Mr. Lewis in regard to the latter's $500,000 campaign contribution, by acquiescing in Mr. Lewis' C. I. O. censorship of the United States mails; by ignoring other forms of lawlessness which bear heavily on many people besides employers, and seriously affect the prestige of the federal government, of which he is the chief magistrate. Therefore, his own prestige must necessarily suffer; and it has.

Rising Tide

The mild revolt of members of congress, despite the tremendous pressure the President is able to apply through expenditure of billions of dollars of federal money, is proof enough to most of us that his prestige is on the wane; that his plan to change the form of our government may not succeed. Many people reluctant to believe that there is such a design upon our American institutions have been convinced; the effect of the report of the senate's judiciary committee on the President's plan to pack the Supreme Court was telling; no President ever received a greater rebuke; even the minority who supported him had no defense to offer.

The present labor troubles have definitely sharpened issues, and so have served a useful purpose. No longer can any employer hide his head in the sand like an ostrich and hope that he will be ignored by, or that he can ignore, passing events. It is now definitely admitted by responsible members of the administration that complete unionization and closed-shop are the goals aimed at. The President apparently favors the C. I. O. not so much on account of its $500,000 contribution to his campaign expenses, as because it seems better organized to accomplish his purpose.

The American Federation of Labor is what its name implies. It is American. It is a federation of independent national or international unions, largely representing skilled crafts and trades. It is democratic. Its president has only such power as he can obtain by force of personality and persuasion. It is handicapped with jurisdictional problems because of overlapping trades and crafts. It has ambitious leaders who covet its presidency. In short, being a democratic American institution, it is inefficient and often ineffective. With such institutions the President has little patience.

The C. I. O. was organized and is headed by an autocrat. His methods are those of an autocrat, or in less polite language, of a racketeer. The C. I. O. exists for only one purpose, to supply money and power to the man who controls it. What he proposes to do with that power we do not know yet; but probably it is to make and unmake Presidents and smaller political fry. Like any unscrupulous organization it is efficient and effective where democracy fails. It is free from jurisdictional disputes because it is organized on a vertical basis—all the employes in a plant or in an industry being grouped into one union.

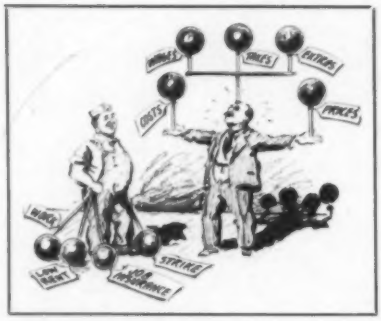
Producers and manufacturers are faced with the compulsory unionization of their plants. Do they want to preserve Americanism, or do they want greater efficiency and effectiveness than is possible under American democracy; or do they want both? Or are they waiting to let chance decide the issue? And will it make any great difference in the end whether C. I. O. or A. F. of L. wins over their employes? These are the all absorbing questions in the minds of employers, whenever and wherever one talks with them.

The American Federation of Labor has provided several avenues to take over the employes in the rock products industry. In the case of plants in or near large metropolitan areas the Federation is attempting to organize the industry under the jurisdiction of the building trades' councils. The building trades councils are local federations of the building crafts' unions. Through these they have the power to boycott the products of non-union plants, or of plants organized under the C. I. O.

In most cases the labor in these plants is organized, or can be organized, into three unions—(1) the skilled and semi-skilled labor in the engineers' and hoistmen's union, (2) the truck drivers' union, (3) the common labor or hod carriers' union. This gives the employer three unions to deal with, all nominally members of the local building trades' council, but subject to jurisdictional disputes, any

one of which may tie up operations.

In the case of plants not in metropolitan areas, the American Federation of Labor is permitting or encouraging organization under the international quarrymen's union. This was originally a skilled craft union of stone cutters, but it has been gradually branching out through the years and absorbing the quarrymen in lime and crushed-stone plants. Now it takes in all employes of any rock products plant—it is a true vertical union. Numerous cement plants have been organized under a cement workers' union, affiliated with the American Federation of Labor which is sometimes also a complete vertical union. Both these A. F. of L. vertical unions have been flirting with C. I. O., according to rumors.



In the case of C. I. O.—the committee on industrial organization—there appears to be no rhyme or reason to the scheme of organization. Rock products plants have been organized under the auspices of the plate glass workers' union, the automobile workers' union, the steel workers' union, or what have you, locally. They are all vertical unions very loosely hung together by whatever authority the organizers, who get so much per head for herding them together, are able to exert.

Most employers probably prefer the vertical type of union for obvious reasons. The employes in some instances have shown decided preferences. The C. I. O. is taking in members for little or no initiation fee. The A. F. of L. unions, in some instances, ask as high as $250 for an initiation fee, with correspondingly high monthly dues. So the workers' desire to belong to a democratic institution is tempered by the cost.

Probably, in the majority of rock products plants, where the average number of employes is perhaps 20 or 25, and the owner is the boss, the employes do not want to join any union. It is just a useless expense. They know they can't have work when the plant has no orders to fill; they know their boss is not exploiting them; they care nothing about John L. Lewis' ambitions; they do not want to be exploited by him or by the President. In most cases they do not yet sense that they are actually being exploited politically. But in at least one case we know of they have organized to maintain a 60-hour week during the operating season!

There are two ways to meet the demand for unionization. The United States Steel Corporation has demonstrated one way; some of the large independent steel companies the other way. The Steel Corporation is being roundly condemned by many for its way. It merely said it would deal with *any* organization of its employes, but would not deal exclusively with it nor compel membership in it. If this organization is not responsible and breaks its agreement with the corporation it would seem that the union and not the corporation will be the larger loser. No law can make irresponsible men responsible, but fair treatment and a sympathetic attitude may develop a sense of responsibility where none existed before.

The attitude of T. M. Girdler, leader of the independent steel manufacturers, is popular with many employers. What he says he is contending for are:

(1) Workers should be free to join or not to join a union as they choose, without coercion from any source.

(2) No employe should be forced to pay dues to a union against his will.

(3) All employes should be permitted to take a vote by secret ballot on whether or not they want to strike.

(4) There should be full publicity and public accounting of the financial affairs of every union.

(5) The responsibility of a union in any contract or agreement should be equal to the responsibility assumed by a corporation. Appropriate laws to that end should be enacted.

To these general principles no fair-minded man can object. The question is whether Mr. Girdler is adopting the best methods of establishing them. The Steel Mediation Board, of which Charles P Taft, Cincinnati, Ohio, is chairman, says: "We have looked into the operation of some of the plants where the union has had a contract, including one particularly called to our attention by the employers. The responsible executives inform us that, considering the novelty of the arrangement in their plants and the inexperience of the men in union affairs, it is working reasonably well. The success depends largely upon the leadership in the particular plant."

Mark well the last sentence in that quotation. The time will come when employers must accept responsibility for the kind or character of their employes' leadership (or their moral safety) just as they now accept responsibility for their physical safety. For the kind of leadership with which a plant is blessed or cursed will eventually be determined by the kind of treatment its workers receive from their employer. If there is genuine good faith and understanding on both sides, employes will not become a prey for any length of time to scheming agitators, as Mr. Girdler has apparently demonstrated is the case of the majority of his own company's employes.

Other employers may take their choice of the two methods, depending possibly on how sure they are of the loyalty of their employes. Eventually they are likely to end at the same goal. The employes, whether they have joined up or not, are going to find that their fortunes are more closely tied to those of fair-minded employers than to the unions. The Steel Corporation is testing the strength of C. I. O. by giving it plenty of rope; the independents by a fight. Mr. "C. I. O." Lewis is better adapted to a fight than to leeway. He may hang himself.

Workers will understand that there is a limit to demands. If automobile workers insist on terms and conditions that increase the price of cars appreciably, the families of other workers will make the old bus do for another year.

Coming!

THE AUGUST ISSUE of Rock Products will contain a very complete description of the new lime plant of H. E. Millard, Annville, Penn. This plant has a 290-ft. rotary kiln and many features never before introduced in the lime industry — incorporating the long experience of Mr. Millard and of one of the foremost engineering firms with cement plant experience. Watch for it!

—The Editor.

Large County Project

ST. CLAIR COUNTY QUARRY, ILL., is to furnish 50,000 tons of crushed limestone for use in improving 41.75 miles of township and county roads near Belleville, Ill. WPA is paying $195,306 for labor and materials, while the county is investing $69,000 for equipment, rentals and supplies.

Preparing to Quarry

SNAKE BUTTE quarry, Mont., is practically ready to furnish stone for use in Fort Peck dam. Power transformers are now in place, a water supply has been developed, warehouses, garages and offices have been established and cars are being assembled to transport stone to the dam. About 750,000 cu. yd. of stone are to be quarried.

Big Blast

WAUKESHA LIME AND STONE CO., Waukesha, Wis., set off its largest blast in years recently when 60,000 tons of rock were shot down. Five tons of powder were used in 27 holes drilled 15 ft. apart, 16 ft. back from the face and 45 ft. deep. Mrs. Mae O'Laughlin Gillen is president of the company.

Copyrighted Milwaukee Journal

Mrs. M. Gillen, president

Buys Plant

EASTERN ROCK PRODUCTS, INC., Utica, N. Y., has purchased a plant site at Sidney, N. Y., to be used in conducting a stone, sand and gravel business. Alfred Pendlebury will be manager.

Opening Marble Quarry

VERMONT MARBLE CO., Rutland, Vt., is planning to open its quarry at Radersburg, Mont., as soon as machinery can be shipped. Geo. O. Johnson will be superintendent of the plant.

Big Rock Blast

JOHN T. DYER CO., Pottstown, Penn., recently blasted some 250,000 tons of rock in one shot, using Nitramon as the explosive. The explosive was placed in two tunnels and ten well-drill holes.

View of blast at the Waukesha Lime and Stone Co. quarry

Copyrighted Milwaukee Journal

Charlottsville Stone Corporation's New Plant

USES FOUR DIESEL ENGINES

By Bror Nordberg

When the Charlottsville Stone Corp., Charlottsville, Va., was forced to discontinue operations within the city limits due to cramped quarters and excessive operating costs, it replaced this plant with one of unusually economical operating expense, mainly due to the installation of Diesel engines for power.

The new modern plant has now been in operation at Shadwell near Charlottsville for seven months and has a daily production of 400 to 500 tons of sized stone. The deposit, a very tough greenstone of volcanic origin, covered with from 2 to 3 ft. of overburden, is being worked on a 35-ft. face.

A combination of vertical and horizontal drilling is used in quarrying this hard rock. Two type 68 Jackhamers are used for the vertical drill holes and a Gardner-Denver drill for the drift holes. Holes are generally put down 12 ft. back from the face and spaced from 8 to 9 ft. apart, the spacing varying with the density of the stone to be shot down.

Some rock, mainly that under a hanging toe, is sledged by hand and hand-loaded to Lambert 1¼-yd. automatic skip buckets. These buckets are spaced around in the quarry, where it is inconvenient to handle the rock with the power shovel, and are picked up by an International truck, equipped with the necessary hoisting mechanism, and hauled to the primary crusher. Most of the tonnage of stone, however, is loaded into two International and one Ford trucks by a Bucyrus-Erie ⅞-yd. steam shovel.

The primary crusher is designed to take 10-in. and under stone, so special precautions are taken in the quarry to eliminate delays at the crusher due to the lodging of large boulders.

The trucks each carry about 1½ tons of stone to the load, with from 250 to 300 loads of rock being hauled to the crusher daily. Coming out of the quarry, each truck stops at a platform on which an employe is stationed to sledge large rocks to 10-in. and under in size. The use of this man has saved much time that would have been lost in releasing rock jamming in the primary crusher.

Crushing Plant

This crusher, a 10-in. Superior-McCully gyratory, is belt-driven by a 88-hp. 4-cyl. Caterpillar Diesel engine. Through this crusher, the rock is reduced to 3½-in. and under. The throughs are carried over a 24-in. belt conveyor on 86-ft. centers to the screening plant and passed over a 4-x12-ft., double-deck, Tyler-Niagara vibrating screen, no scalper being used. Directly below the screen are the four storage bins of 35 to 40-ton capacity each. The second deck of the screen is split, to give four sizes to go to the bins. These are generally 3½-in. and plus stone, 3½x3-in. stone, ¼ by ¾-in. stone and minus ¼-in. screenings.

The plus 3½-in. stone from a surge bin, is used to feed a Symons 3-ft. cone crusher, preparatory to making finer sizes. The large stone sized over the vibrating screen can similarly be used as direct feed for the Symons crusher when the bin is full, or this size may be stockpiled by truck. Stone from these bins is chuted to the crusher directly, upon opening bin gates and releasing stone to the chutes. A 20-in. belt conveyor, 50 ft. centers, transmits these crusher throughs to the main belt conveyor for passage through the same screen. This crusher, which is operated only intermittently, is driven by another 88-hp. Caterpillar Diesel engine through a belt drive.

A second screening plant, constructed to be used for a washing plant at a later date, is now being used for re-screening or for additional small stone sizes. Stone from the plant bins is chuted to a 16-in. belt conveyor carrying it to the screens in this plant. Here, sizing is done over two 3x6-ft. double-deck Tyler-Niagara screens at present, all decks are not being used, and five sizes of stone are being made. This second screening plant is now being operated mainly to reclean stone as it comes from the first unit. Below these screens are three bins of 70-ton total capacity. All stone is shipped by truck, the company operating six trucks of its own, each of 2 tons capacity.

Auxiliary Equipment

In addition to Diesel-engine drives on the two crushers, the Ingersoll-Rand 12x11-in. air compressor is V-belt driven by an 88-hp. Caterpillar Diesel engine. This compressor furnishes compressed air at 80 p.s.i. for use in the quarry, and for starting the Diesels. A Diesel-generator unit is used to furnish elec-

Plant of Charlottsville Stone Corp., Shadwell, Va. Primary crusher in foreground. Diesel engine power houses in right background

trical energy for all necessary small motors driving the screens, conveyors and water pump. This is a 62-hp., 3-cyl. Caterpillar Diesel engine direct-connected to a General Electric 3-phase, alternating-current generator rated at 37.5 k.v.a. and 30 k.w. Excitation is by a shaft-driven General Electric 12-amp., direct-current generator.

A 7½-hp. electric motor drives the long conveyor; a 7½-hp. motor drives the Tyler-Niagara vibrating screen; two 5-hp. motors are used to drive the two short conveyors; and a 3-hp. and a 5-hp. motor drive each of the other sizing vibrating screens with a 1-hp. motor driving the pump for the air compressor cooling system. The Diesel-generator set furnishes the electricity for these motors.

So far, the average fuel consumption of the four Diesel engines has been about 15 gal. of fuel oil in a 10-hr. day, a remarkably low power cost.

New Concrete Pipe Plant

J. A. M. VALLETTE, Case Grande, Ariz., is to manufacture large concrete pipe for use in irrigation work and for farm purposes. It is planned to manufacture concrete headgates and building block at a later date.

Files Trade Name

R. C. HOLM QUARRY was recently filed as a trade name at Waterloo, Iowa, by R. G. Holm and Walter N. Handy.

New Plant

OLE HERMANSON, formerly of Black Falls, Wis., has moved to Tomah, Wis., and established a concrete block plant.

Snake-hole drilling supplements vertical drill holes in this deposit—a very tough greenstone

Some rock is hand-sledged and loaded into 1¼-yd. skip buckets which are "picked-up" and hauled to the crusher by truck

Still Growing

HENRY SHIELDS, Waverly, Iowa, who started the manufacture of concrete block as a side issue, is reported to have developed an extensive business, which he expects to continue and develop.

Improvements

AMERICAN PORTLAND CEMENT CO., Foreman, Ark., is reported making more equipment installations costing $200,000.

To Build Bagging Plant

CANADA CEMENT CO., LTD., Montreal, Que., has taken an option on a site at Chatham, B.C., for the purpose of erecting a storage and bagging plant.

Suspends Production

NORTH AMERICAN CEMENT CORP., Alsen, N. Y., plant, stopped production for the month of June with a large supply of clinker and finished cement on hand.

Truck dumping to the Diesel-driven primary breaker

Finer sizes are made by passing stone to a reduction crusher, also Diesel-driven

BELOW—Diesel-driven generator to provide power for small plant motors

BELOW—The air compressor is driven by Diesel engine through V-belts

Numerous Changes in Equipment

MAKE OLD PLANT EFFICIENT

Medusa Portland Cement Co. Rehabilitates Plant of the Former Crescent Portland Cement Co., Wampum, Pa.

By BROR NORDBERG

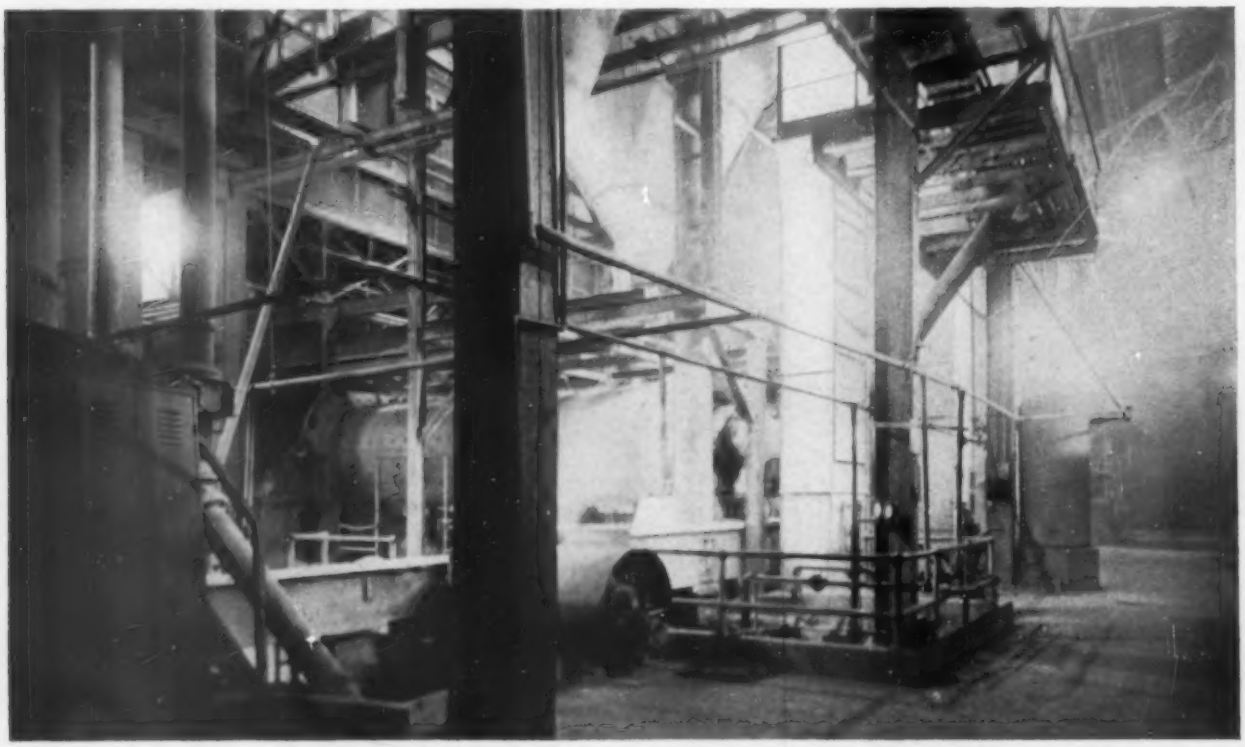
A GENERAL TIGHTENING UP of the manufacturing processes, the addition of air separation for both the raw and finish grinding, and the installation of heat recuperators constitute changes made at the Wampum, Penn., plant of the Medusa Portland Cement Co. that have reduced the coal consumption per barrel of cement by 30 lb. and improved the quality of the finished product.

Efficiencies have been so improved in the operations preceding the actual burning of clinker in the kilns, and in the firing of the kilns, that the use of two of the old kilns has been discontinued.

Before the installation of air separators, both the raw and finish grinding were two-stage processes in open circuit, but since two 16-ft. Sturtevant separators were installed on the stone side, the grinding efficiency and capacity of the tube mills for secondary grinding have been so increased that two tube mills of the original four are now sufficient. The other two mills more recently have been closed-circuited with a single 18-ft. Raymond separator for the grinding of standard, waterproofed and high early strength cement clinkers.

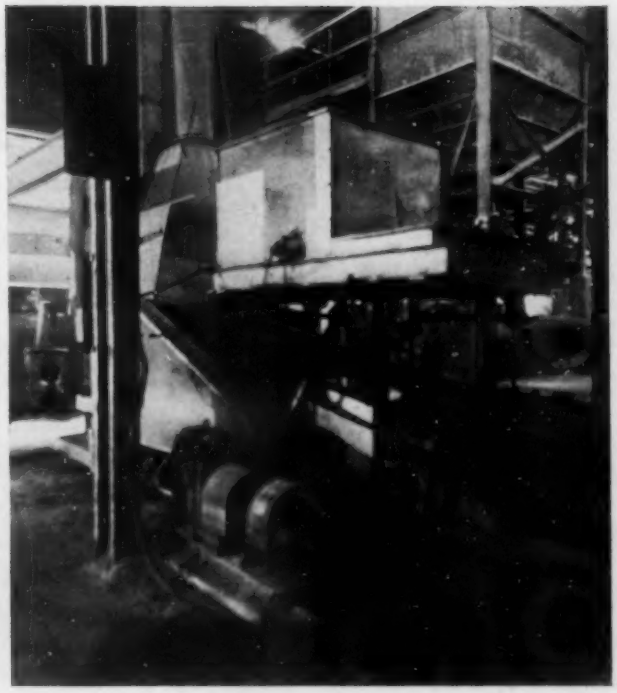
Raw Mill Changes

The ease with which the clinker is now ground, since installation of recuperators for rapid air quenching, has made it possible to utilize the No. 1 Hercules mill formerly used for the preliminary grinding of clinker to preliminary grind stone and shale. This machine has been remodeled to permit the larger feed required. By so doing, rock discharged from the rotary dryer is con-



One of the 16-ft. air separators closed circuited with mill for raw grinding

Feed end of clinker cooler

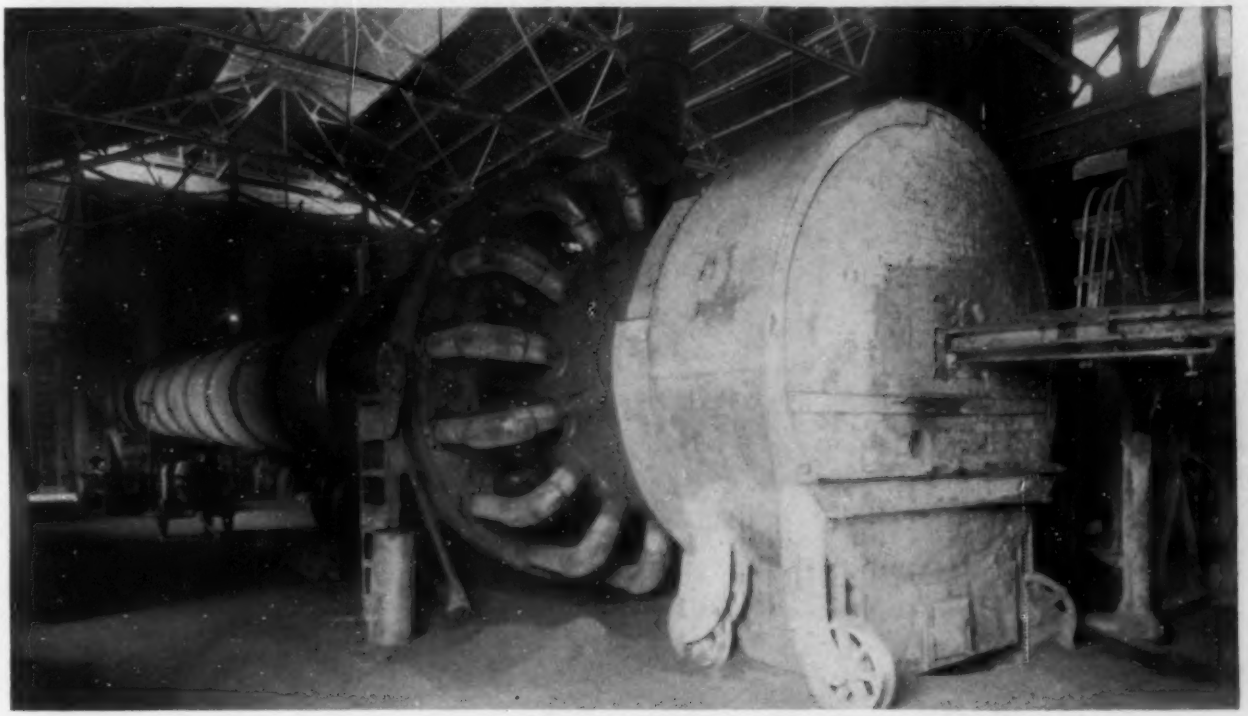


Scale for weighing clinker

veyed to this single mill in place of two hammer mills, no longer in use. After preliminary grinding, through a 2½- to 4½-mesh screen, the rock is split and passed through the No. 3 and No. 4, 7x26-ft. Traylor tube mills, the other two being set aside for clinker grinding. These tube mills were compartment mills, from which the sections have been removed to speed up the operation in closed-circuit with the Sturtevant separators. A separation of the raw product is made to permit 90% to pass the 200-mesh sieve. The rejects return to the mill and are pumped to blending bins and blended by a Fuller-Kinyon system.

Kiln Changes

Changes have been made in the four 8- x 125-ft. kilns now in operation, de-



New heat recuperator on one of the kilns at Medusa Portland Cement Co. plant, Wampum, Penn.

creasing the coal consumed to 85 lb. per barrel of cement clinker. Each of the kilns is equipped with an 8-ft. Vanderwerp recuperator. One of the four kilns has a 10-ft. diameter burning zone. Two recuperators were installed three years ago, and the newer type CI units were installed on the remaining two kilns in 1936. The draft has been cut to as low as 0.05 in. to keep the burning zone nearer the front end of each kiln, for a greater temperature change at the recuperator. The sudden quenching and reduction of temperature of the clinker at the point of discharge from the kiln, of about 1600 deg. F., has speeded up the grinding speed of clinker (in a glassy state) tremendously. The kilns are each equipped with water-jacketed fuel pipes and each receives its air blast from a Bayley fan.

Waste Heat Boiler Changes

Speeding up each kiln has been instrumental in increasing the hourly production of clinker. Present production is about 145 bbl. of clinker per hour. Previously five waste-heat boilers were operated in connection with the six kilns. Sectioning of the common flue has been done recently so that each kiln serves a waste-heat boiler. This creates a better kiln draft condition, in that variations in one will not necessarily affect the others.

The fifth boiler, a 1000-hp. auxiliary boiler, is no longer operated by waste heat. It is fired by a Blomatic stoker, manufactured by the Herborn Engineering Co., Sandusky, Ohio, which pulverizes and injects the fuel into the boiler in one operation. The stoker is automatically operated by a mercoid switch in the steam header. At 200-lb. steam pressure the stoker cuts out and a drop to 198-lb. pressure cuts it in again. The steam pressure is accelerated upward rapidly, since 50% of the combustion takes place in suspension and the other 50% on the grates.

Clinker Cooling

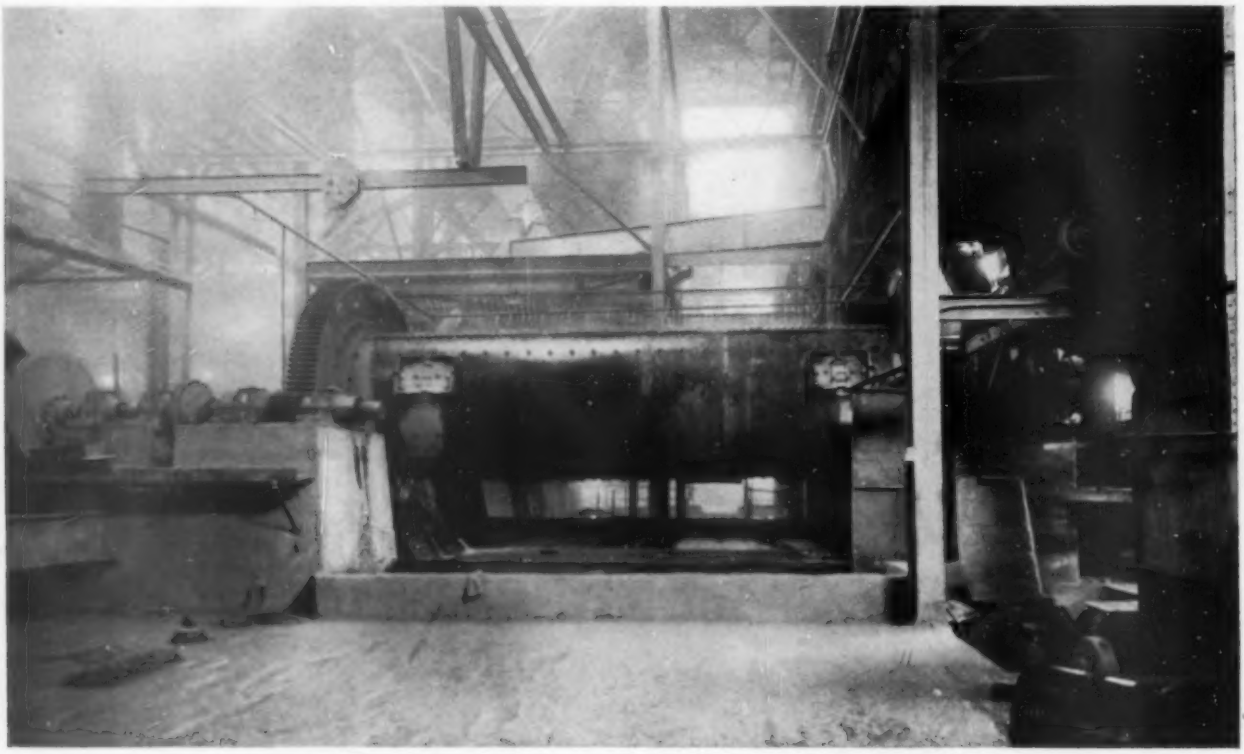
Clinker from the kilns was formerly carried to outside storage for cooling. The plant was remodeled into a straight line plant without any provision for storage of clinker, except in case of emergency, to eliminate time required to cool hot clinker and to insure a constant low temperature clinker going to the grinding mills. Clinker coming from the kilns has a temperature of about 900 deg. F., and is carried by outside Peck conveyors traveling over and above the old clinker storage. Clinker is chuted to an 8- x 84-ft. rotary cooler recently installed, where the temperature is dropped to the point where it can be carried over an ordinary belt conveyor.

The cooler is in the open and is lined with baffles to continuously turn the clinker to permit the maximum contact with the atmosphere. To save the steel chute from excessive wear due to abrasion caused by the dropping clinker, sections of angle iron have been placed transversely in the chute at intervals. The stretches between the angle iron fill up with clinker and the falling clinker has a clinker lined chute to flow over. The cooler has a pitch of ½ in. to the foot, makes one revolution in 40 seconds and can handle up to 225 bbl. of clinker an hour.

Cooled clinker discharges to a 24-in., inclined belt conveyor, 17-ft. centers, equipped with ordinary rubber belting, to the boot of an elevator, lifting it to the preliminary grinding mill feed bins. The belt conveyor is equipped with a Merrick automatic scale to record the flow of clinker from the cooler to the bins.

Finish Grinding Changes

Preliminary grinding takes place in the No. 3 Hercules mill, which has a capacity capable of keeping two secondary mills in full operation. The No. 2 Hercules mill may be used for either stone or clinker, in event of a breakdown of either the No. 1 or No. 3 mills. Originally the three mills were needed for preliminary clinker grinding, to be followed by eight 6- x 22-ft. tube mills. These eight mills have been displaced by the No. 1 and No. 2 Traylor mills formerly operated for secondary grinding of stone and shale. The partitions



New separator, closed-circuited with two mills for final grind. Mills are water cooled

have been taken out of the mills, which now operate as straight tube mills, closed-circuited with the 18-ft. Raymond separator recently installed.

The separator is operated in the manufacture of the three main cements; standard, waterproofed and high early strength; and is equipped with a double set of whizzers, designed specifically for the manufacture of cements of high specific surface. Standard cement is ground to a fineness of 90% through the 200-mesh, with a specific surface of 1600 cm.^{2} per gm., while high early cement has a specific surface of 2600 to 2700. Two of the eight tube mills now out of service are occasionally used in the manufacture of specials. Their elimination from regular use has meant the discontinuance of eight 250-hp. motors, while only a few small motors were added.

Dust Damage Suit

SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., was made defendant in a damage suit by Guy Powell who claims that dust from the plant at Concrete has made his home practically unlivable. The company and the plaintiff have erected towers to determine the dust concentrations in the air.

May Statistics

PORTLAND CEMENT INDUSTRY in May produced 11,634,000 bbl., shipped 11,890,000, and had in stock at the end of the month 25,491,000 bbl. Production and shipments showed increases of 4.8 and 5.8% respectively, as compared with May, 1936. Stocks at mills were 24.8% higher than a year ago.

The statistics here given are compiled from reports for May, received by the Bureau of Mines from all manufacturing plants. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of May, 1936 and 1937.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	May 1936	May 1937	Apr. 1937	Mar. 1937	Feb. 1937
The month ..	48.9	53.2	48.8	38.6	29.6
The 12 mos. ended	31.6	47.9	47.6	47.0	45.8

Progress

PORTLAND CEMENT ASSOCIATION, Chicago, Ill., through Edward J. Mehren, until recently president, announced: "During 1935 approximately 90,000 new homes were built. The records show that 3.8% were of concrete construction. In 1936, 180,000 units were erected. The number constructed of concrete amounted to 8.3% of the total."

Improvements and Machinery

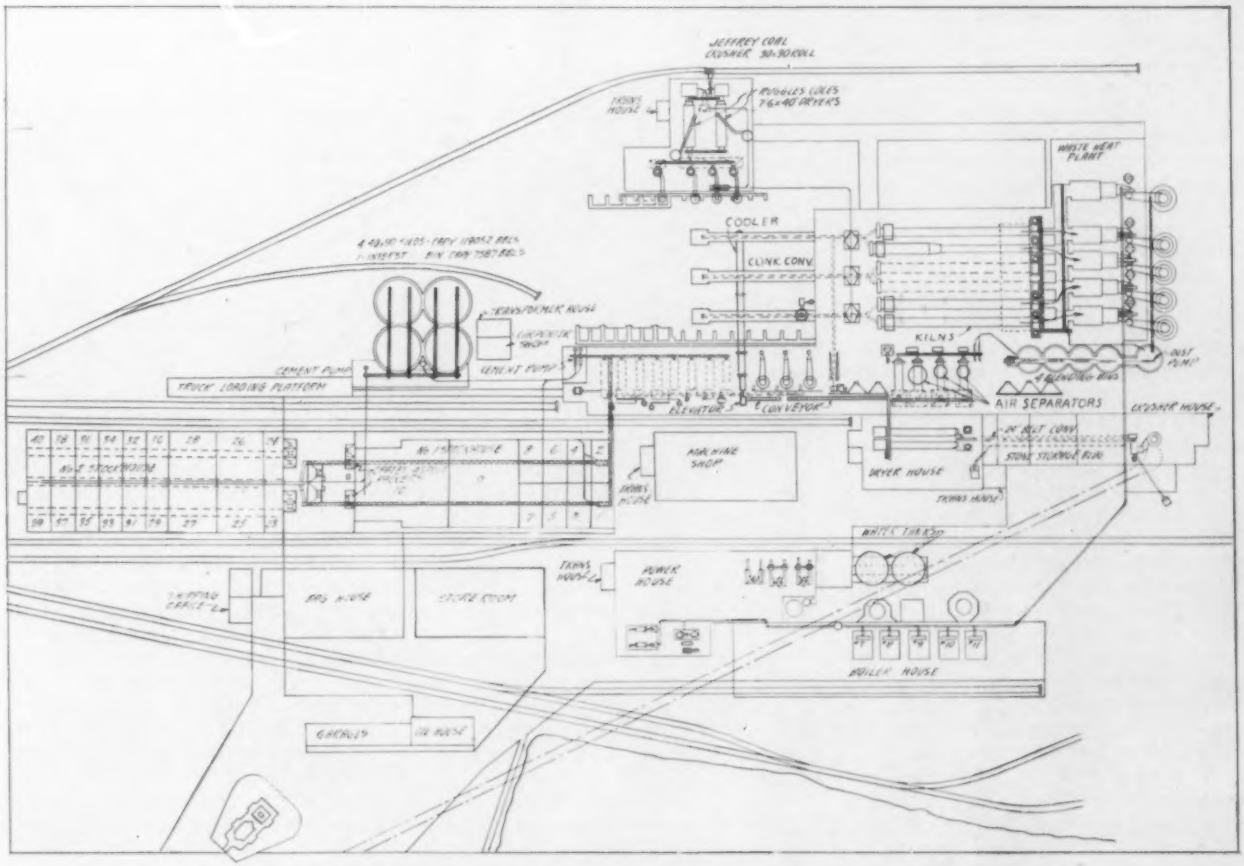
MANITOWOC PORTLAND CEMENT CO., Manitowoc, Wis., was to have resumed operations late in June after completion of an extensive modernization program designed to increase production efficiency.

Pay Increases

LEHIGH PORTLAND CEMENT CO. and NORTHWESTERN STATES PORTLAND CEMENT CO., Mason City, Iowa, plants, have announced wage increases effective as of May 1. Both plants are now operating at a higher percentage of annual capacity than for several years.

Fuller's Earth

A MILL for processing Fuller's earth has begun production at Paris, Tenn. Location of the mill followed investigations of the Tennessee Division of Geology in locating an ample supply of the material in Henry county near Paris.



General plan of the revamped plant of the Medusa Portland Cement Co., Wampum, Penn.

GYPSUM ANHYDRITE

As a Base for

PLASTER PRODUCTS

By E. F. MacTAGGART, B.Sc., Consulting Chemical Engineer, London, Eng.

ANHYDRITE nearly always occurs in association with gypsum, wherever there are deposits of the latter. Most of the deposits of sulphate of calcium which are of commercial interest have been formed by the evaporation of marine waters, and the conditions under which this has occurred governs the type of the deposit, and often the relative amounts of anhydrite and gypsum laid down.

From water containing a high proportion of common salt, sulphate of calcium is deposited as anhydrite at temperatures of 25 deg. C. and over, and consequently it is nearly always anhydrite that is found in association with rock salt deposits. At temperatures above 32 deg. C., anhydrite is deposited from all calcium sulphate solutions, and the occurrence of anhydrite or gypsum is often, therefore, an indication of the temperature conditions under which evaporation and deposition occurred. This is not always so, however, because it is probable that much of the gypsum which occurs is of secondary origin, having been formed by subsequent hydration of anhydrite originally deposited. This is probably the case in the Nova Scotian deposits, where gypsum occurs for varying thicknesses at the surface, but anhydrite is persistent at depth.

Until recently the occurrence of anhydrite has been of interest chiefly in lowering the value of gypsum deposits on which it has intruded. Reserves of the more useful mineral have been reduced below expectations, and trouble and expense have been involved in avoiding, or separating the anhydrite. A certain tonnage has been used as a fertilizer for peanut crops in the Eastern States, being ground and shipped chiefly from Nova Scotia for this purpose, but no other major use has been developed in America.

In England, the position is somewhat different.

At Billingham, County Durham, England, there are extensive anhydrite deposits, worked at a depth of about 800 ft., by Imperial Chemical Industries, Ltd. Here, where the mineral occurs in massive form in a seam many feet thick, very little gypsum is found, and no appreciable quantities have been raised to the surface. The cement works operated by Imperial Chemical Industries on this site obtains its gypsum supplies from outside sources, and although research has been done in an attempt to use anhydrite as an alternative retarder, this work has largely confirmed earlier findings that the replacement is impracticable.

Editor's Note

THE AUTHOR describes a process perfected in England of mixing a catalyst salt (chiefly alkali sulphates) with raw ground anhydrite to make a finish coat plaster of considerable merit. Interior partition tile and colored plaster, similar to sand finish, are also made. It is believed that this is the first time this process has been described in an American publication.

—THE EDITOR.

Industrial Uses

The anhydrite mine at Billingham was opened up in about 1920, the aim being to use the mineral as principal raw material in the manufacture of ammonium sulphate, and other sulphate fertilizers. For this purpose, something like two million tons of anhydrite have been raised, though the rate has greatly fallen off in recent years as a result of world economic factors. The calcium carbonate produced as a by-product has been largely used in place of quarried chalk or limestone in the manufacture of cement by the wet process referred to above.

A second use for the Billingham anhydrite, which accounts for about 120,000 tons per annum, is as raw material in the manufacture of sulphuric acid and cement by a dry process. This process was developed first by the I. G. Farbenindustrie A-G, at Leuna, Germany, where gypsum is used. Calcium sulphate takes the place of calcium carbonate in ordinary cement manufacture, is mixed with clay, and burnt in a dry process kiln. The oxides of sulphur produced in the burning are collected and converted to sulphuric acid. The use of anhydrite in place of gypsum here involves no important changes in the process, and results in a certain heat economy, as there is no water to be driven off.

For Plaster

It is, however, the third use for anhydrite, as an alternative to gypsum as a base for plaster products, with which this brief review is chiefly concerned. The Billingham deposits have so far been the sole ones used for this purpose, except experimentally in small quantities.

The story may be said to begin in 1925 when Victor Lefebure took out a British patent for the catalysing of anhydrite to make plaster by inorganic salts, chiefly alkali sulphates, having then been engaged on experimental work for some years. He found that a plaster with satisfactory setting properties, and good final hardness could be made from various samples of anhydrite tested, these including rock from Nova Scotia. Most of the early work was done on stone from a neighbouring deposit to that at Billingham.

Lefebure took out a further patent in 1929, and a Canadian patent in the same year. These had somewhat narrower and more definite claims than the earlier patent, and especially claimed the efficiency of a combination of zinc sulphate and potassium sulphate as a catalyst for anhydrite. On this basis, the first important commercial development, and much of the later work, were built up.

The existence of a developed source of anhydrite in the Billingham mine, and the success of preliminary tests brought Lefebure and Imperial Chemical Indus-

tries together, and the latter began, in 1930, research and development work on a large scale. In the following year, I.C.I.'s "Pioneer" plaster, made solely from anhydrite, was placed on the market, and has enjoyed an increasing sale ever since.

Process

The manufacturing process is very simple, being no more than a grinding and mixing operation combined. The anhydrite is mined and crushed to 1-in. cube for all purposes, by a central crushing plant situated at the pit-head. The quantities required for plaster manufacture are then diverted to a storage hopper from which weighed quantities, together with the catalyst addition, pass by table feeder to a tube mill. A weighed quantity of potassium and zinc sulphates, totalling 2% or under, is added to each batch of anhydrite. All reasonable salt combinations have been tested out in the I.C.I. laboratories, but no improvement over this combination has been found.

The tube mill reduces the anhydrite to a fineness of about 15% retained on 170-mesh. This sieve has an aperture of 0.0035 in., and is one of the standard sieves used in British cement testing. No figures for residue on the 200-mesh sieve are available.

The activity of set of the plaster naturally varies directly with the fineness of grinding, and with the percentage of addition of accelerators, and the optimum conditions have been found to be at about the figures named. Further size reduction of the anhydrite has an adverse effect on its working properties, for it then becomes sticky and difficult to spread and trowel. It would be of advantage, for ease of working, to grind somewhat coarser, if this could be done without lengthening the setting time. The difficulty is largely overcome by making a small addition of relatively coarse and inert particles to the ground plaster, gypsum being used for this purpose in about 20-mesh size. This appreciably improves the trowelling properties, without otherwise affecting the behavior of the plaster.

The product is conveyed to a silo, and packed out in 100-lb. bags by a Fluxo packer.

Small Water Requirement

The plaster, selling all over the United Kingdom under the trade name of "Pioneer," is a light grey powder screening under 20% retained on a 170-mesh sieve. It is gauged very easily with water, and attains working consistency with an addition of about 28%. It will be noticed that this is very much less than that required by any other type of gypsum plaster. An important result of this is that there is a much smaller quantity of surplus water to be dried out of any plastering work in which it is used; consequently, the structure is dry earlier, and painting or other decoration can proceed sooner.

It also follows that, since a mix of working consistency of this plaster contains less water, it also occupies less volume than do other plasters, and would be expected to have a lower covering power. This is undoubtedly the case where equal thicknesses of different plasters are applied, but anhydrite plaster has an advantage which largely overcomes this fact.

Good Finish Coat Plaster

The trowelling properties, chiefly considered as ease of spreading, of this plaster are exceptionally good, and in face coats on a good quality sand backing, work for which the plaster is best suited, it is found that the plasterer frequently achieves his result with a slightly thinner layer, so that the effective covering power of the plaster does not suffer by comparison with others. Labor costs in mixing and trowelling are somewhat reduced.

The small amount of water to be removed by evaporation naturally results in a dense product; this factor added to the great binding power of the neat plaster gives a surface of unusual hardness.

The neat plaster has a gradual set, begins to stiffen shortly after mixing, and reaches "final set," as determined by the Vicat cement test, in 50 to 70 minutes. Good workability persists for some ½-hour after gauging, and it is a valuable property of the plaster that it can be re-tempered at any time prior to final set, if necessary adding more water, without appreciably affecting the set or final hardness of the plaster.

The salts used to accelerate the plaster do not cause efflorescence, and are harmless to all forms of decoration. The plaster is very inert. After setting has occurred, the added salts are not dissolved out by cold water; and before setting is complete the plaster is almost precisely neutral in reaction, the initial slight acidity probably being removed by the small percentage of carbonates present in the rock. Decoration of the neat plaster is, therefore, unusually safe, and the absorptive capacity of the surface is normal and favorable unless adversely affected by extraordinary conditions. The aggregate of these properties make anhydrite plaster an unusually good finishing plaster on high quality sand backings.

Not Good for Rough Coat

The plaster should always be used neat in face coats, and in this condition has a marked advantage over hemihydrates in workability. This property is not carried over into sand-mixes. The sand carrying capacity is lower than that of hemihydrate plasters, and the mixes work "short," set slowly, and are friable if at all lean. In general, satisfactory results with sand can only be obtained by the use of a mixture so rich in plaster as to be uneconomic.

The plaster has no value as a gauging material for lime putty. Small percentages of lime largely destroy the setting action, which is only natural since the latter partly depends on the presence of an acid salt. By restricting the catalysis to neutral salts the adverse effect of lime is lessened, but not removed, and a further danger occurs. The combination of lime and appreciable amounts of alkali sulphates set free caustic alkalies, which have a disastrous effect on paint films, emulsifying and softening the oils therein, often with destruction of the color and the surface. Lime is best kept away from all salt accelerated plasters.

Production of anhydrite plaster reached 15,000 tons in 1935.

Opens Large Field

The existence of practically inexhaustible supplies of pure anhydrite in Nova Scotia and elsewhere in America lends great interest to these results. How do the Canadian deposits compare with those at Billingham for the manufacture of plaster and other products from anhydrite? This question was answered by some work done by I.C.I. several years ago in testing a typical consignment of anhydrite from Nova Scotia. The results showed that the white Canadian rock was superior in almost every respect.

The Billingham stone runs about 90% $CaSO_4$, while 95% should be steadily attainable from Nova Scotia. The color of the plasters made from the imported samples was very good, being nearly white, with a slight grey or pink tinge. Furthermore, panels made from them were not darkened by excessive trowelling, or persistently damp conditions, as sometimes occurs with the Billingham plaster, and is a serious disadvantage when the intention is to cover the plaster with a low cost distemper treatment.

The cause of this darkening is somewhat obscure, but is certainly an optical effect caused by undue absorption of light over certain areas, owing to loss of opacity in the plaster, as opposed to pigmentation. This is sometimes associated with increased hydration where damp conditions prevail, but, as stated, can often be induced by excessive trowelling where unusual compacting of the surface layers may cause translucency.

Before leaving this subject, it is interesting to observe that anhydrite plaster withstands very damp conditions and

intermittent water percolation better than other gypsum plasters; it is not rendered soft and mushy, and is sometimes hardened since the hydration of the plaster is rarely complete, and is often taken a stage further by this later water addition.

The setting time of all the Canadian samples, with the same accelerator content, and similar fineness, was shorter than the Billingham sample, although one of the former contained about 25% of gypsum initially. The rock generally is more active, and a high class plaster, with possibly wider applications, can be made at a lower processing cost from this than from the British anhydrite.

Other Products

The preparation of the plaster described above was the first and most important anhydrite building product. Based on it, research work has been done on a number of other products, and two at least have been brought to commercial development.

The first of these was the partition tile. A dry mixture, of similar composition to the plaster, has a small addition of carbonate and an acid constituent incorporated. When mixed with water, carbon dioxide is evolved and aerates the mass before setting starts. The mix is poured into moulds, dividing plates are inserted, and the mass allowed to set. The moulds are then stripped, and the blocks, 2 ft.x 1 ft.x 2 in., 3 in., or 4 in., are dried in chamber or tunnel dryers.

These blocks weigh about 55 lb. per cu. ft. and are suitable for all non-load-bearing partitions. They are inert, free from movement due to heat or moisture, of sufficient strength, and of accurate dimensions, so that a competently built partition can be finished off with a single face coat of neat plaster, for which anhydrite plaster is very suitable. The blocks have now been on the market for about five years and have been successfully used in many important buildings and architectural schemes.

The second derived product which has reached commercial development is known as "Fine Aggregate Walling." This material consists of colored aggregates incorporated in a colored binder, which are purchased separately, so that any desired combination of colors can be obtained in the finished work. There is available a range of six colors, each represented in binder and aggregate. The binder is essentially a colored anhydrite plaster, and the aggregate consists of the same material, mixed with water, set, dried, and granulated before sale.

The mixture is trowelled on in the ordinary way, and has a finish similar to a sanded plaster, as the particles of aggregate average only about ⅛ in. diameter. After setting, the face is rubbed down to a smooth finish with two grades of emery paper, thus disclosing and emphasizing the color contrast of the aggregate and binder. It is usual to finish off the treatment with a wax polish. The result is a pleasing decorative effect which can often replace tiles, marble and terrazzo at a much lower cost.

Cement Research

ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD., London, England, has lost by death S. G. S. Panisset, its director of research. *Cement and Lime Manufacture* (Great Britain) says of him: "Although his name was not so well known to engineers and chemists generally as that of others engaged in cement research, his great knowledge and experience were known and appreciated throughout the world by those best qualified to judge his ability. During the past few years he had devoted a great deal of attention to the production of special cements for special purposes, and had been elected to the committee of the Institution of Civil Engineers which is considering this subject. His advice was sought by many other professional and trade associations. He took an active part in the preparation of the British Standard Specification for Portland Cement and of the specifications for certain pre-cast concrete products, and at the time of his death he was concerned with the difficult problem of producing a standard specification for lime."

Developing Gypsum Deposit

A. R. ENO, Fort Dodge, Iowa, has started the development of gypsum land on his airport property by installing crushing and handling equipment at a cost of $30,000. The rock will not be processed, but will be sold after crushing. A dragline crew has stripped overburden from two acres of land. The tract contains an estimated 2,000,000 tons of gypsum rock.

Introduce TDA to Europe

DEWEY AND ALMY CHEMICAL CO., Cambridge, Mass., recently sent Benjamin Fairbank to Europe to discuss with leading cement manufacturers cement-making problems and supervise trial runs to demonstrate the grinding economies and greater strength and durability of portland cement claimed by the use of TDA, the company's new catalyst-dispersing agent. Mr. Fairbank is well-known in the cement industry, particularly on the West Coast, where he has spent the last few years as field engineer of the Dewey and Almy Chemical Co. During his stay abroad he will make his headquarters at the associated British company, Dewey & Almy, Ltd., in London.

Sand-Lime Brick Production and Shipments

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States. They may be considered representative of the industry.

Ten active sand-lime brick plants reported for the month of May, this number being the same as that reporting for the month of April, statistics for which were published in June.

Average Prices for May

Shipping Point	Plant Price	Delivered Price
Milwaukee, Wis.	$10.00	$12.50
Pontiac, Mich.	12.50	14.00
Detroit, Mich.	....	16.00
Mishawaka, Ind.	9.35	....
Syracuse, N. Y.	14.00	16.00-20.00
Saginaw, Mich.	10.90	....
Madison, Wis.	11.50	13.00
Watertown, Mass.	....	13.50

Statistics for April and May

	April†	May†
Production	3,062,785	3,752,515
Shipments (rail)	226,000	347,000
Shipments (truck)	2,993,070	3,193,220
Stock on hand	4,682,452	4,290,300
Unfilled orders	3,710,000	2,680,000

† Ten plants reporting; incomplete, three not reporting unfilled orders.

Sand-Lime Block

In Michigan, price of sand-lime block was reported as 14c for the 8x8x16-in. size and 18c for the 8x12x16-in. size.

Completing Extensive Improvements

THOMAS AND BROWN LIME CO., Manitou Springs, Colo., is completing improvements to its plant costing about $100,000. The quarry has been completely modernized.

Ban on New Plants

GERMAN GOVERNMENT'S prohibition of new establishments in the cement industry, which expired October 1, 1936, has been extended to the end of 1937. Manufacturers were urged by the government to utilize the period of favorable and remunerative operation to rationalize their equipment and plant organization, which is said to have been done in most cases. A price reduction on portland cement was decreed by the German ministry of National Economy, effective November 1, 1936. The reduction, 1 mark per metric ton, means an average cut of 5%.

New Advertising Manager

UNITED STATES GYPSUM CO., Chicago, Ill., announces the appointment of Frank R. Babcock as advertising manager. Mr. Babcock has been associated with Nash Motors Co., Kenosha, Wis.

B. V. Hedrick Gravel and Sand Co.

Material dumped from cars sluiced down hill

Unusual Transportation

B. V. HEDRICK GRAVEL & SAND CO., INC., Lilesville, N. C., has a very unusual method of getting its raw material to the washing and screening plant. A clay gravel is excavated by a 3½-yd. and a 4-yd. Bucyrus-Erie draglines with 80 and 100-ft. booms, respectively, which load upwards of 125 Western type dump cars of 12 cu. yd. capacity per day. These are pulled by a steam locomotive, in three-car trains, to a hopper which feeds a sluiceway 300 ft. long to the top of the plant.

A 6-in. stream of water turned into the sluiceway at its head furnishes the motive power to convey the material. By the time the material reaches the first screen it is already pretty well separated from the clay. Plant washing and screening is done in the regular way with clean water.

Another view of sluiceway to plant

Ready-Mixed Concrete

THE EXECUTIVE COMMITTEE of the National Ready Mixed Concrete Association met in Buffalo, N. Y., June 23, and selected Cincinnati, Ohio, the week of January 31, as the place and time of the next annual convention. The convention will be concurrent with that of the National Sand and Gravel Association and one or two sessions—those relating to such common problems as the federal legislative program—will be held together.

Lime Association

NATIONAL LIME ASSOCIATION announces the election of Mrs. M. K. Lounsbury, treasurer, Allwood Lime Co., Manitowoc, Wis., as a director of the association representing District 8.

The association has decided to respond to requests for samples of liming materials by making a limited number of exhibits available to high school agriculture instructors. All but a few of the first 300 have been sent to schools in New England, New York, Pennsylvania and New Jersey. During the summer about 700 additional exhibits will be made. These will be distributed to schools in other areas early in the fall. It is also proposed to make these exhibits available to member companies at cost. A sample exhibit and explanatory letter will be sent to each member in July or August.

Cement Circular

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., has published an attractive circular in colors illustrating and describing the properties of three new products recently placed on the market. These are high early strength portland cement, waterproofed portland cement and mortar cement.

Extensive Plant Improvements

RANSOM SAND AND GRAVEL CO., Eugene, Ore., has modernized its plant considerably and tripled the capacity since the controlling interest was acquired by Louis Johnson a few weeks ago. Dredging equipment was installed and a gasoline shovel, additional trucks and gravel washing machinery were added.

Sand and Gravel Statistics

SAND AND GRAVEL OPERATIONS in the United States in 1935 employed 8,566 wage earners and paid wages totaling $8,340,408. The number of wage earners was obtained by averaging the total reported on pay rolls on the fifteenth of each month. This procedure gives a somewhat lower figure than the total number actually engaged in the production of sand and gravel during the year for more than 10,000 were employed in the peak months. Salaried officers, technical and supervisory employees, and others working on a salary basis in sand and gravel production in 1935 totaled 2,086 with salaries amounting to $3,820,735. Expenditures for supplies and materials, fuel, and purchased electric current amounted to $11,948,889. Supplies and materials comprised 69% of the total; fuel, 15%; and purchased electric current, 16%. The total value of products of the sand and gravel industry in 1935 was $53,700,627, which includes $459,675 for work or services.

These data are based upon replies courteously furnished by mine operators to certain special questions carried on the Bureau of Mines' report form for 1935, by coöperative arrangement with the Bureau of the Census.

Trucks and dragline replace pumping operation

Trucks and Dragline Replace PUMPING OPERATION

Manning & Locklin Northville Co., Detroit, Michigan

Manning and Locklin Northville Co., Northville, Mich., replaced a pumping operation with a larger plant less than two years ago that has been practically in continuous operation ever since. The new plant, of about 1000-yd. daily capacity, is a shovel and trucking operation.

About 90 acres of land are available containing a high grade of sand and gravel to a depth of 30 ft., below which is an abundance of good material separated by 1 to 5 ft. of clay. Present workings are down to the 30-ft. level, but will extend below in the near future.

Excavation and Transportation

Stripping to a maximum of 3 ft. is removed by a Northwest ¾-yd. gasoline-driven dragline and loaded into 2½-ton Republic trucks. The pit is quite variable, with gravel sizes predominating in one location and sand in another. All material is hauled from the pit to the plant hopper in four new Dodge 1½-ton trucks. Sand is loaded by a new Lorain 40, ¾-yd. gasoline shovel and gravel is loaded by a Thew 60, 1-yd. shovel.

Trucks end-dump to an 8-yd. hopper feeding a 24-in. belt conveyor, 100-ft. centers, discharging to a 3x18-ft. rotary scalping screen. Directly below the scalper are two No. 5 Austin-Western gyratory crushers, one serving as the primary and the other as a secondary crusher. A separation is made by the scalper so that plus 3-in. stone passes through the primary crusher, 1¼- to 3-in. stone goes to the secondary and 1¼-in. minus stone bypasses the crusher. The crusher discharges are re-circulated through the screen and crushers until all is reduced to 1¼-in. and under for the sizing plant. The crushers are so arranged that in the event of a breakdown of one, the second can handle its share also. The past winter the plant was in full operation with improvised heaters placed below each crusher to keep the oil fluid.

Sizing Screens

Minus 1¼-in. stone is carried to the screening plant over a 24-in. belt conveyor on 118-ft. centers. Sizing is done over three 3- x 5½- x 6-ft. Link-Belt conical screens set in tandem. A roller the length of each screen is used to punch out gravel lodging in the screen openings. Separations of gravel are made in 1¼-⅞, ⅞-½, and ½-¼-in., going direct to separate bins below. The ¼-in. minus material passes through a long flume, where masons', medium and sharp torpedo sand are settled out. Three bins are provided for gravel and three for sand, totaling 970-yd. storage capacity for all sizings.

All deliveries from the plant are made

Truck dumping into a field hopper. Crusher is at the right

General view of deposit

General view of plant

by truck. When the bins are full, open stockpiling is used, from which trucks are loaded by a ⅜-yd. Buckeye gasoline shovel. A reservoir has been made in a nearby swamp for a wash water supply, two 4-in. Fairbanks-Morse pumps providing the screens with wash water.

Thermal Expansion of Typical Rocks

"THE THERMAL EXPANSION OF TYPICAL AMERICAN ROCKS," a 36-page illustrated bulletin by John H. Griffith, has recently been published, from a study of about 100 rocks of the types commonly used for building purposes, listing the coefficients of linear thermal expansion for each. Copies may be had free of charge upon request to the Director, Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa.

Talc Property Threatened

CAROLINA TALC CO., Murphy, N. C., has been threatened with the loss of its talc mines at Kinsey, near Murphy, from waters to be backed up by the Hiwassee dam, a TVA project. The Tennessee Valley Authority is making studies to determine the possibilities of protecting the property.

Better Business

MILWAUKEE, WIS.: Prices of sand and gravel were advanced 10c per cu. yd., May 15, bringing the current price to $1.85, including delivery. Crushed stone prices reached $1.80 per cu. yd. The increase was caused by wage raises for laborers and haulers. Labor disturbances have fluctuated the general volume of output, producers say, pointing out that a 25% increase has been felt here since January 1 over the same months last year. Sales during the past year were reported far ahead of 1935 and the best since the low point of the depression. Reports from 10 leading producers in Waukesha county, one of the leading counties of the state in sand and gravel output, indicate a substantial sales increase for 1937 if the current rate continues. Sales in the county for last year amounted to nearly 75% of the output of 1932 and 35% of the total for 1929, the best year of production in the history of the industry. Releasing of construction contracts here this spring are expected to boost sales to municipalities and counties far above the amount sold for public works in recent years.

Gravel Washing Plant

PIONEER CONSTRUCTION CO., Kittaning, Penn., has erected a gravel washing station on the Williams farm on Route 108, south of Route 20, in West Springfield, Ohio. Gravel will be brought to this location and washed for use in construction of a new highway. Water has been impounded in a ravine dammed up for the purpose.

Fire Damage

WISSOTA SAND AND GRAVEL CO., Haugen, Wis., suffered $60,000 damages to its plant by fire June 10.

Large Contract

TRIANGLE ROCK CO., San Bernardino, Calif., and Charles Holmes, on a joint bid of $108,400, received a reclamation bureau contract recently for preparation of concrete aggregate for the construction of Imperial dam.

Marble Plant to Open

MASTER MARBLE CO., Clarksburg, W. Va., is to resume operations in July or August after the usual summer shutdown for repairs.

Dissolution

MOOSIC SAND AND GRAVEL CO., Wilkes-Barre, Penn., has dissolved and will present articles of dissolution to the state, having already wound up all the affairs of the company.

Adds Equipment

ST. LOUIS, MO., Municipal Workhouse is installing approximately $30,000 worth of new quarrying and crushing plant equipment, which will increase its capacity of crushed stone from 350 to 750 tons a day.

Resume Operations

HERSEY GRAVEL CO., and GRAND RAPIDS GRAVEL CO., Hersey, Mich., have resumed operations.

Permanently Enjoined

GARDEN CITY GRAVEL CORP., Weston, Mass., was the loser in a suit brought to prohibit the corporation from excavating gravel from its land on the Post Road near Sudbury, Mass. Zoning laws prohibit the commercial use of properties in the residential sections of the city.

New President

MISSISSIPPI RIVER SAND AND MATERIAL CO., St. Louis, Mo., has elected James Fitzgerald president. Other new officers are Michael Hendy, treasurer, and George Herbst, secretary.

Three conical screens set in tandem

Secondary gyratory crusher

Two pumps in tandem convey silica and water direct from a sump to wash bins

RUBBER-LINED PUMPS

Transport Silica at Plant of

WEDRON SILICA COMPANY, WEDRON, ILL.

SOMETHING NEW in the handling of silica from the quarry to the wash bins—direct pumping by electrically-driven pumps—now displaces the use of a series of pulsometers and a drag elevator at the plant of the Wedron Silica Co., Wedron, Ill. This radical departure from a practice of many years' standing was done only after considerable study and, while only in operation a comparatively short time, already has proved its economy and efficiency and has increased the quarrying capacity per hour.

Quarrying is taking place at a location 1600 ft. from the processing plant. A 100-ft. face is being worked. Five-inch well-drill holes are spaced about 20 ft. apart, are set 18 ft. back from the face and are drilled to the full depth of 100 ft. Drilling proceeds at the rate of about 50 ft. a day and 1 lb. of powder brings down an average of 10 tons of silica.

From this point, hydraulic placer mining methods are used, consisting of the washing down of the silica to a sump. As yet, one pulsometer is used at the face to boost the mixture of silica and water to the sump above the newly-installed pumps. The quarry has an abundance of natural springs, which are utilized as the supply of water needed for mining.

An American Well Works pump furnishes water for mining at the rate of 500 g.p.m. under 100 p.s.i. pressure, through a 2-in. hose and 1-in. nozzle. The pulsometer is operated by 100 p.s.i. steam pressure from a central plant.

The pulsometer discharges into the top of a 12-ft. x 8-ft. square concrete sump built above the new pumps in the new pump house. The discharge passes over a grizzley with ½-in. openings to remove foreign matter such as nails, etc., and the larger pebbles. The sump serves the purpose of supplying a constant source of silica and water to the electrically-driven pumps and maintains the head.

In the event the pulsometer relays "slugs" of material without sufficient water for transmission through the pipeline, provision is made to furnish auxiliary water directly into the sump to maintain a constant head and to prevent the breaking of prime.

The two No. 5 Allen-Sherman-Hoff rubber-lined Hydro Seal pumps each have a 6-in. discharge and are connected in tandem, the first pump taking silica and water from the bottom of the sump and the second one pumping it the required 1600 ft.

The discharge from a 500-g.p.m. fresh water pump also goes into the top of the sump box to maintain a constant head when the discharge from the pulsometer varies, and to furnish necessary water for the silica suspension, when the pulsometer is pumping practically all solids. The pump is operating continuously, but its discharge is automatically controlled by a float valve in the sump box. Some

water is generally desirable, so the discharge end of the pump is allowed to "bleed" continuously.

One of the problems encountered is to take care of large slugs of material from the pulsometer, which, when they reach the pump intake in the bottom of the sump, tend to clog. Agitators are provided on either side of the intake in the form of high pressure jets of water from the mining pump, keeping the silica constantly agitated and in suspension.

The pump system is designed to deliver 200 tons of solids to the wash bins per hour, when the single pulsometer also is replaced by an electrically-driven pump. Present production is 175 tons per hour, as compared to 150 tons with three pulsometers and a drag elevator. For the required capacity, the travel in the pipe line is 1000 f.p.m., requiring 60% water and 40% sand to keep the solids from settling out in the pipeline and for the maximum delivery of solids.

The pumps are pumping against a 100-ft. head and have a hydro-seal pressure of 120 p.s.i., part of which is furnished by a small booster pump. Each of the main pumps is driven by a 100-hp. G.E. motor through V-belt drive. The motor on the second pump is variable speed, in case production is to be further increased.

A new American Well Works pump to furnish 1000 g.p.m. under 100 p.s.i. pressure, to be driven at 3500 r.p.m. by a 100-hp. motor, is being installed in the new powerhouse for a second mining hose to be installed.

Top: The pulsometer discharges silica to the sump through a grizzley

Center: Pump discharge pipeline passing through tunnel on way to wash bins

Bottom: Silica and water are lifted 100 ft. to the wash bins in center

At present, the discharge line from the pumps travels along the quarry floor and follows the incline of the old drag elevator into the wash bins. Since the dividing wall between the quarry being operated and the next closest one to the plant is to be worked out and the tunnel between them is to be destroyed, the pipe line will be changed to have the lift directly at the quarry and travel on the ground level to the plant.

The discharge from the pipeline passes through a 3x12-ft. Allis-Chalmers rotary screen, with 1/16-in. openings, where coarse granules and undesirable particles are screened out. Directly below the screen are two 25-ton wash bins side by side. The throughs from the screen can be diverted to either wash bin. After washing in these bins and the floating out of the magnesium clays and other undesirables, the bins are drained to two similar bins below for a second washing.

From the second set of wash bins, a hydro-seal pump pumps the silica through a 100-ft. tunnel and into four 600-ton drain bins. After draining for 48 hours in these bins and the moisture content has been reduced to 6 or 7%, a clamshell bucket removes the product to steam coil dryers, after which the silica is graded on Tyler Hum-mer screens.

The electrification of the quarry has meant considerable savings to the operators. The cost of electrical power saves a cent per ton of pumped solids over the costs of steam power, representing a saving of $2 an hour. Another saving is the lack of repair and maintenance as compared to the old setup with several units to go out of order.

Recently a 6x22-ft. Allis-Chalmers tube mill was added to grind silica flour as fine as 300 mesh, increasing the plant's capacity for silica flour by 33⅓%.

Mineral Resources

VIRGINIA: Bulletin 47, Educational Series No. 3, Virginia Geological Survey, by William M. McGill, recently issued, is an interesting outline of the character and location of the mineral resources of the state. These are largely nonmetallic minerals, particularly limestones, for which Virginia is famous. In addition to valuable coal and limestone deposits in the western part of the state, the mineral wealth includes granite, sandstone, quartzite, silica, slate, asbestos, barite and clays. There are also small deposits of metals, including gold—about $3,300,000 of which has been recovered since Virginia was settled by white men.

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NEW MEXICO: Bulletin 12, State Bureau of Mines and Mineral Resources, "The Non-Metallic Mineral Resources of New Mexico and Their Economic Features (Exclusive of Fuels)," by Sterling B. Talmage and Thomas P. Wootton, is a 160-pp. book with a "mineral resources" map of the state. It is designed to present a summary of available information to date. Since New Mexico is remarkably rich in mineral deposits of all kinds, particularly coal, limestone and gypsum, we presume the day will come, if the center of population of the U. S. A. moves nearer, when these deposits will be very important economically.

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TENNESSEE: "Summary of the Mineral Resources of Tennessee," by Kendall E. Born, division of geology, State Department of Education, Nashville, is a 102-pp. booklet, in coarse type, illustrated with outline maps. As the title implies, it is purely a summary and contains little detailed information on specific deposits. A bibliography, however, is included, so that an investigator may pursue his search if he desires.

To Quarry Sandstone

PRESTON SAND CO., Kingwood, W. Va., a new concern, is starting a sandstone crushing operation near Irona. A railroad spur has been laid and mining and crushing equipment has been installed.

New Ownership— To Step Up Production

OHIO QUARTZ CORP., Jackson, Ohio, has been sold to R. Green Annan and his associate J. E. McKelvy of Pittsburgh, Penn. Mr. Annan, the new president, is president of the Union Mining Co. and the Maryland Fire Brick Co., Mt. Savage, Md. The plant is being placed into full production and will be expanded to produce 1,000,000 brick per month.

Foundrymen Visit Sand Plant

NEW JERSEY SILICA SAND CO., Millville, N. J., on June 11 entertained a large group from the Metropolitan Philadelphia Chapter of the American Foundrymen's Association at its sand plant. The program included a buffet luncheon, visits to the various sand deposits, a trip through the plant and laboratory and a shore dinner at Bridgeton, N. J., where there was a talk on foundry sand by Harry W. Dietert, Detroit, Mich., expert, as well as entertainment. Clarence R. Wolf, secretary-treasurer, New Jersey Silica Sand Co., did the honors as host, and a very fine time was had by all.

Metropolitan Philadelphia Chapter of the American Foundrymen's Association visits New Jersey Silica Sand Co. plant

Prices Bid—Contracts

GENEVA, OHIO: City council awarded contract for 2000 tons of slag to Kelley Island Lime and Transport Co. at $1.95 per ton.

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SAN FRANCISCO, CALIF.: South City Lumber and Supply Co. was awarded contract by city for 280 cu. yd. ready-mixed concrete at $7.31 per cu. yd. (free standing time 15 minutes, extra $3 per hour).

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INDIANAPOLIS, IND.: State highway commissioner awarded contracts to Ohio-Indiana Stone Co. and Mid West Rock Products Corp. for 1700 to 2400 tons slag f.o.b. Coalmont at $1.65 per ton; 400 to 1000 tons crushed stone f.o.b. Haubstadt at $1.65 per ton; 400 to 1000 tons crushed stone f.o.b. Cynthiana at $1.65 per ton. Mid West Rock Products Corp., Indianapolis, was awarded contract for 2400 tons crushed stone, f.o.b. Washington, at $1.35 per ton and 300 to 500 tons slag f.o.b. Elnora at $1.50. Wabash Sand and Gravel was awarded contract for 1000 to 2000 tons gravel at $1.24 per ton f.o.b. Elnora. Moulding-Brownell Co., Chicago, Ill., has contract for 500 to 1200 tons slag, f.o.b. Solitude, at $1.76 per ton and 800 to 1000 tons crushed stone f.o.b. Mt. Vernon, at $1.65 per ton. Contract for 1500 to 2100 tons crushed stone went to Louisville Cement Co., Louisville, Ky., at $1.65 per ton.

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NASHVILLE, TENN.: Davidson County highway department awarded contract for the ensuing year for crushed gravel to T. L. Herbert and Sons and the Franklin Limestone Co., both of Nashville, at $1.50 per ton.

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ATLANTIC CITY, N. J.: Contract for 800 cu. yd. road gravel was awarded to John Pelto and Co. at 32c per cu. yd.

AMBRIDGE, PENN.: Contract for slag was awarded by the city council to Midland Slag Co., Midland, Penn., at $1.55 per ton delivered at the job and $1.20 per ton in car lots; No. 2, $1.75 per ton delivered on the job and $1.40 in carload lots.

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WYOMING: Bureau of Reclamation, Denver, Colo., awarded contracts for 54,000 bbl. modified portland cement for use in constructing Casper Canal and 15,000 bbl. modified portland cement for use in Seminole dam to Monolith Portland Midwest Co., Denver, Colo., at $2.58 and $2.41 per bbl., respectively.

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ALBANY, N. Y.: Department of Public Works awarded contract for 150 bbl. portland cement to Binghamton to North American Cement Corp., New York, N. Y., for $2.79 per bbl.

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ASHVILLE, OHIO: Pickaway county commissioners awarded contract for 100 tons of gravel to Sturm and Dillard, Columbus, Ohio, at $1.35 a ton delivered; 100 tons crushed stone to Blue Rock, Inc., Washington C. H. at $1.50 a ton.

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INDIANAPOLIS, IND.: State highway department awarded contract for 2350 to 3200 tons size 8F and 650 and 700 tons size 11 crushed gravel at $1.97 per ton to American Aggregates Corp.

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ALBANY, N. Y.: Department of Public Works awarded contracts for 1900 tons crushed stone delivered in Monroe county to Dolomite Products Co., Rochester, N. Y., at $2.10 per ton; 530 tons iron ore tailings or crushed stone to Worlock Stone Co., Canastota, N. Y., at $1.59 per ton; 300 tons crushed stone delivered to Davenport Center to General Crushed Stone Co., Syracuse, N. Y., at $2.20 per ton.

IDAHO: Bureau of Reclamation awarded contract for delivering 35,000 bbl. cement for use in constructing Payette division of Boise federal reclamation project to Oregon Portland Cement Co., Portland, Ore., at $2.37 per bbl.

Tax Adjustment

STANDARD SLAG CO., Youngstown, Ohio, was over assessed $27,206.58 in income taxes for 1930, which the Bureau of Internal Revenue will credit against alleged deficiencies in taxes for other taxable years pending before the United States district court.

Growing Business

ECONOMY BLOCK CO., Wauwatosa, Wis., has over half a million building block units in the stock pile shown herewith. Only about half of them are shown in the picture.

The president of the company, Les. E. Schwalbe, began making block in a small plant sixteen years ago. At that time business was chiefly local. The concern grew consistently until today it has a large modern plant with annual capacity of more than three million units and with shipments by rail and truck radiating into all parts of the state. Using two eight-hour shifts, the plant's daily capacity is 20,000 units. The company manufactures standard block, partition block and floor units. It makes both the light-weight cinder block and the regular sand and gravel type.

Homes, housing developments, business structures and public buildings take a large share of the company's output. "The federal government's resettlement project at Greendale near Milwaukee used more than a million of our units," Mr. Schwalbe said. "They were selected because of their permanence, low maintenance cost and fire-resistive qualities."

Large stock of concrete block—Economy Block Co., Wauwatosa, Wis.

Australia

Presents the Most Up-to-Date

LIME PLANT

Manufacturing Both Liquid and Solid Carbon Dioxide

In Rock Products of February 14, 1931, an article was published, describing the Mount Frome Lime Co.'s works at St. Peters, near Sydney, New South Wales, Australia. These works were the first really modern lime production units erected in Australia, and prior to their construction, the chairman, George F. Davis, traveled extensively through the United States, inspecting modern plants and the best methods of manufacture. At that time, Mr. Davis was greatly impressed by the enormous assistance given him by American executives, and since then has not ceased to praise the wonderful spirit of coöperation existing among the leaders of the American industry. The National Lime Association has given invaluable assistance, and their "Limeographs" and "Bulletins" are eagerly watched for on the arrival of every American mail.

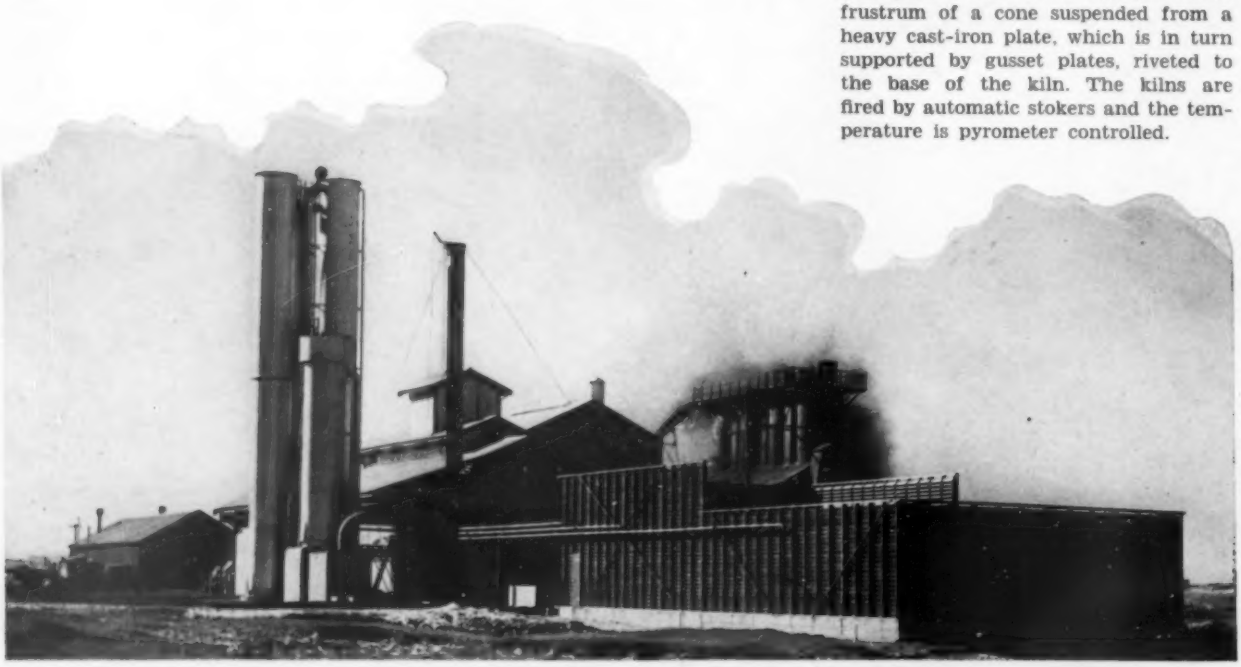
Since 1931, the Mount Frome Lime Co. has made many improvements and additions to its plant. Another kiln has been installed, better production methods introduced, an extensive laboratory fitted and a liquid CO_2 and dry ice unit erected.

The company is fortunate in having extensive deposits of exceptionally high grade limestone within 190 miles of Sydney. The deposits are estimated to contain over four million tons of workable stone, and tests carried out by the Public Works Department of New South Wales have shown it to be up to 99.22% $CaCO_3$.

The plant is ideally situated, on the banks of the St. Peters Canal, giving access by water via Botany Bay to the Pacific, and by railway line to all parts of Australia. The stone is quarried at Mount Frome and railed 190 miles to Sydney where it is unloaded direct into the kilns. A very favorable freight rate has been arranged with the Government-owned Railways, and the trucking of the limestone has proved an economic success.

Stoker Fired Kilns

The type of kiln operated by the company is heavy steel shell, lined with fire brick. The base of the kiln below the firing platform is made from heavy steel plates, reinforced on the inside by numerous stiffening ribs. Furnaces are carried on steel platforms which extend a sufficient distance in front of the firing doors to give a convenient space. In operating these kilns the flame from the coal burned in each furnace is directed through two openings in the kiln shell and lining directly against the limestone which fills the kiln. As the lime passes the burning zone it falls into the cooling cone, made of steel plates. This is an inverted hollow frustrum of a cone suspended from a heavy cast-iron plate, which is in turn supported by gusset plates, riveted to the base of the kiln. The kilns are fired by automatic stokers and the temperature is pyrometer controlled.



A rear view of the Mount Frome Lime Co.'s works at St. Peters, Australia. The water cooling system is shown in foreground

Mount Frome Lime Company's Chairman Profits by American Visit and Contacts

By Alan Evans, Sydney, Australia

George F. Davis, chairman of the Mount Frome Lime Co.

Developed Hydrate

Mount Frome Lime Co. claims to have done more than any other Australian organization in the introduction of hydrated lime into New South Wales. Prior to the entry of the company into the field, hydrate was practically an unknown quantity, but now new avenues of trade have been opened up, and many key industries are supplied for the purposes of bleaching, purification, gas absorption, neutralization, dehydration, precipitation and utilization of by-products.

It is to a considerable extent due to the efforts of the company that hydrated lime is being more generally adopted for building construction, chemical and agricultural purposes throughout Australia.

The finished hydrate is milled to a fineness of 200-mesh. It is packed in either paper or jute bags of 50 lb. and 112 lb. capacity. A large export trade has been built up, especially to New Zealand and the various islands of the Pacific.

CO_2 *Recovery*

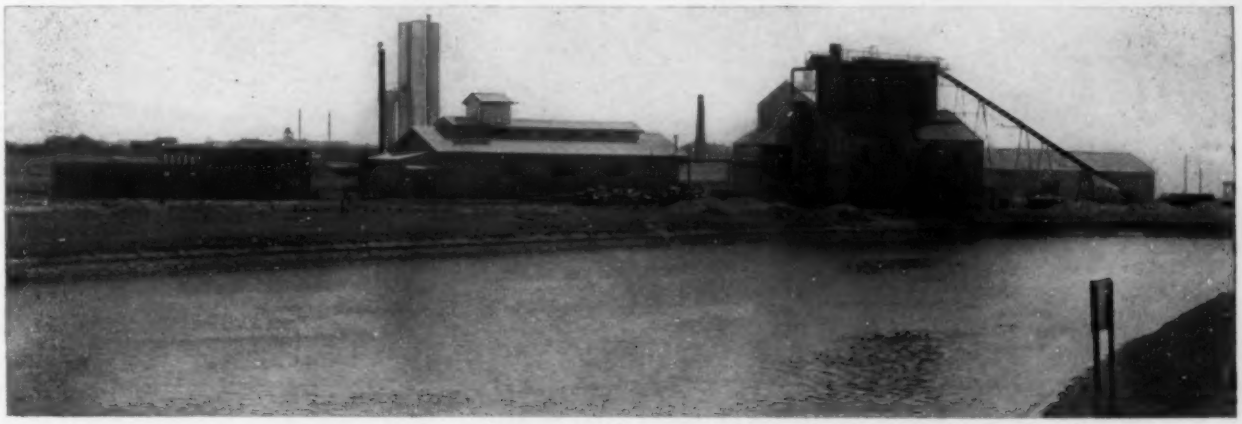
The recovery and purification of carbon dioxide from lime kilns and from the calcination of magnesite is, of course, not a novel thought, but the Mount Frome Co. is the first in New South Wales to put the idea into practice. The manufacture of liquefied carbon dioxide from both these sources was in operation more than 25 years ago, but attention has been directed to the exploitation of limestone deposits because of what may be termed the growth of the infant solid carbon dioxide industry, the product known by the trade name of "dry ice."

Through the progressive policy of the company, dry ice is now being produced on a large scale in conjunction with its lime manufacturing operations.

The new enterprise was launched only after exhaustive investigation and with sufficient proof that the manufacture of pure carbon dioxide gas could be accomplished on a sound commercial basis and with the assurance of orderly progression in volume of business.

The introduction of the new gas is a further tribute to the application of science to industry. The most modern plant and advanced methods have been utilized to bring to reality the findings of engineering and scientific research for the recovery of carbon dioxide. The application of this new process, and the production of the highest quality of CO_2 for trade and industry, heralds improvement not previously attained in carbonating and refrigerating activities.

The impure carbon dioxide gas which forms the raw material is first purified by passing through a water washed tower which removes any mechanically carried impurities and sulphur dioxide.



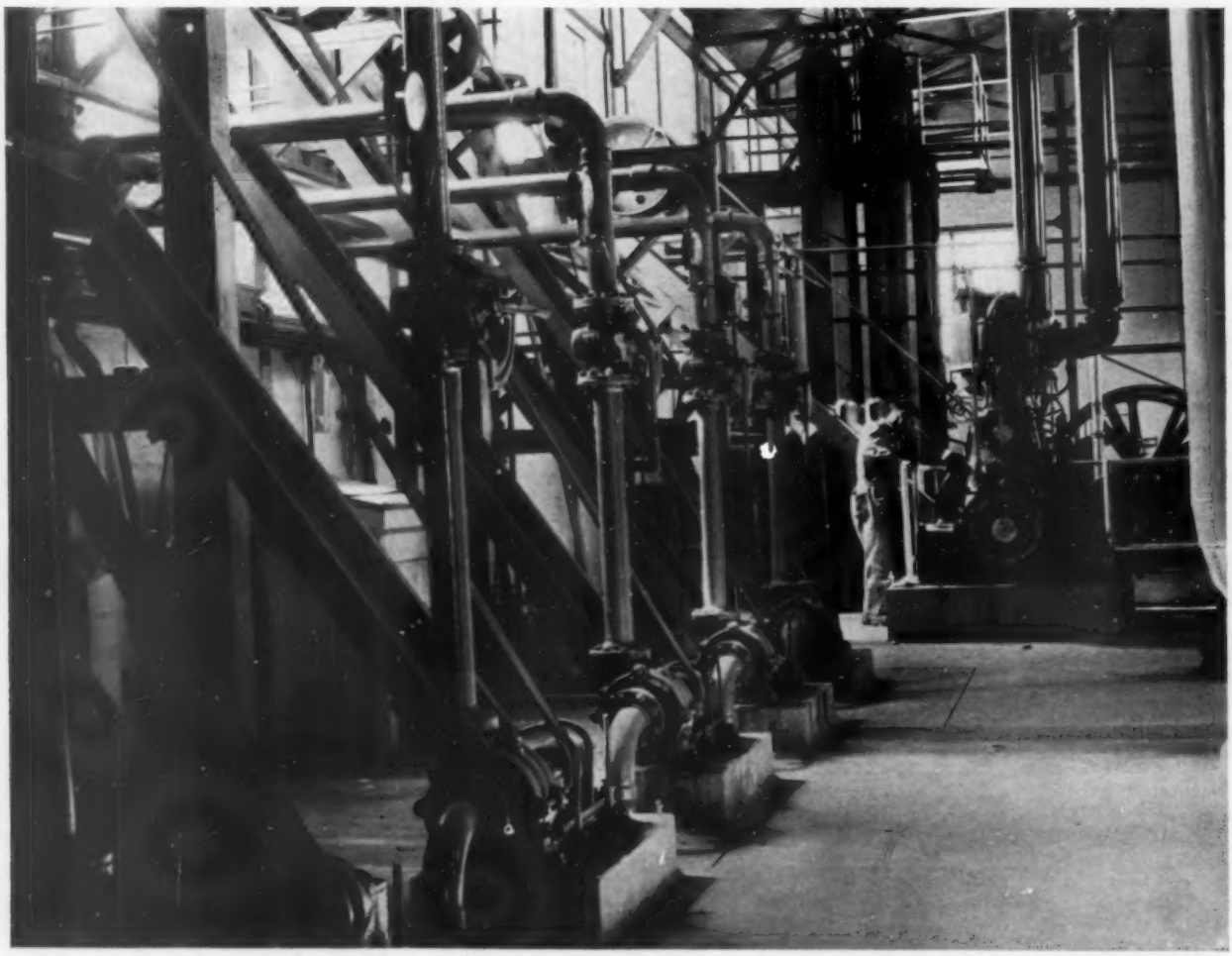
Front view of the Mount Frome Lime Works. The absorption towers are 70 ft. high

Construction view, showing the absorption towers being hoisted into position

The washed gases, consisting of oxygen, nitrogen and carbon dioxide then pass through three absorption towers in series. These towers, 70 ft. high, which form a striking feature of the plant, are packed with coke. Potassium carbonate solution is circulated over each tower, counter current to the gas flow, by centrifugal pumps. The potassium carbonate solution reacts with the carbon dioxide, forming potassium carbonate, so that the solution leaving the No. 1 tower contains a certain proportion of potassium bicarbonate. The nitrogen, oxygen, and unabsorbed portion of the carbon dioxide escape to atmosphere from No. 3 tower.

The bicarbonate solution now passes through a heat exchanger and thence into an evaporator, where it is heated with steam. Heating the bicarbonate solution reverses the chemical reaction which took place in the absorbers, the bicarbonate solution breaking up into potassium carbonate and carbon dioxide.

The potassium carbonate solution from the evaporator passes through the heat exchange mentioned above, thus warming up incoming bicarbonate solution and itself becoming cooled, thence to a cooler, and finally is pumped back to the absorber to perform another cycle. The carbon dioxide from the evaporator now passes through a cooler and thence into a gas holder. Only pure carbon dioxide passes to the gas holder and the gas is tested chemically before it is admitted to this vessel.



Centrifugal pumps for the circulation of potassium carbonate solution. The main steam engine is in the background

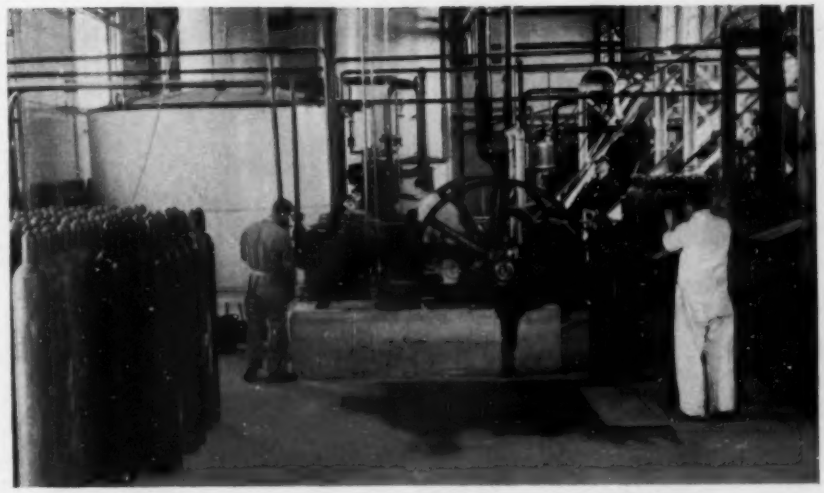
From the gas holder the carbon dioxide is drawn by a three-stage compressor through a drying chamber where all moisture is removed. The compressor, a vertical twin-cylinder type, compresses the gas in three stages—first to 40-lb./sq. in., second to 200-lb. and finally to the liquefaction pressure of approximately 1,100 lb.

Between each stage of the compressor are cooling coils to reduce gas temperature.

The liquid carbon dioxide now passes through a final filter and thence to the main storage which consists of four steel containers each capable of holding half a ton of liquid.

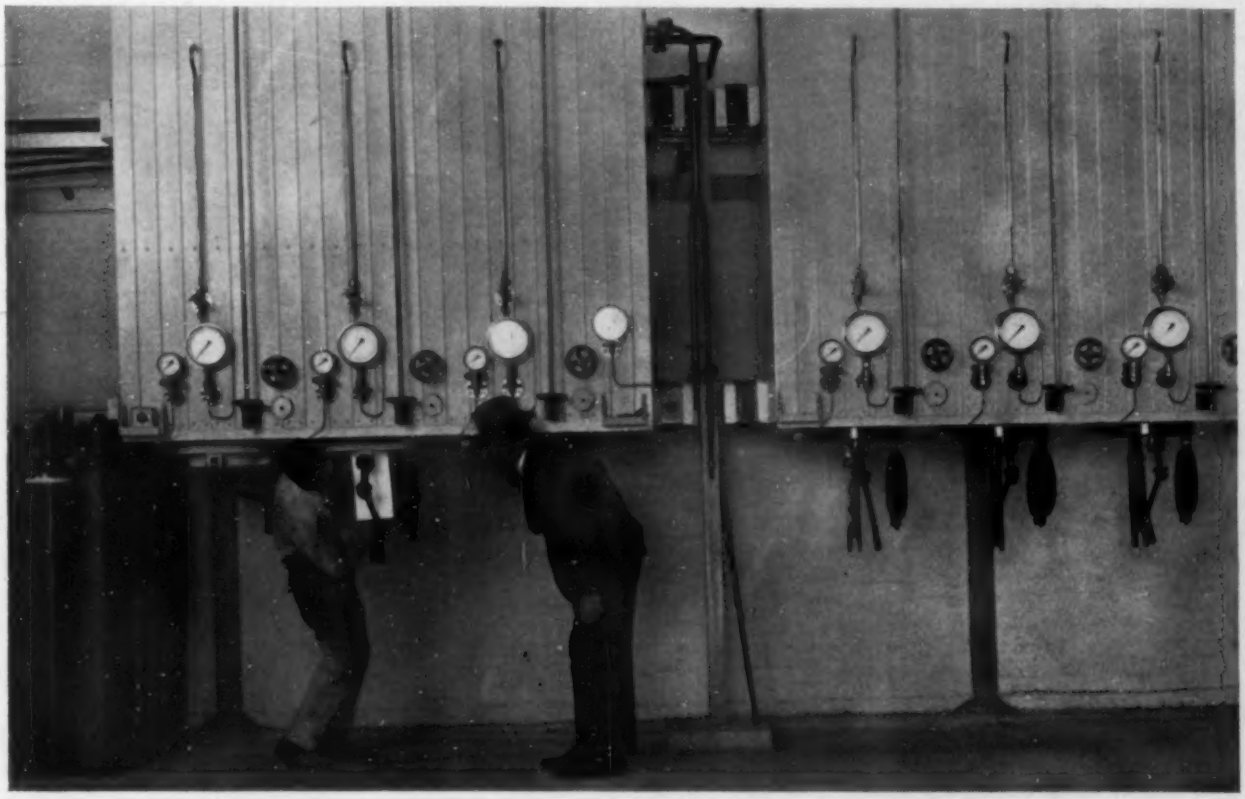
The liquid is then filled into transport cylinders, each of 50-lb. capacity. To ensure accurate weight each cylinder is examined before filling to ensure that it is clean and then, tared on scales immediately in front of the filling station. The transport cylinder is then coupled to the main storage and liquid carbon dioxide run in. A protective cap is fitted and the gas is ready for shipment.

Solid CO_2 or dry ice is manufactured by the Carba system. The plant consists of seven moulds in which the dry ice is actually made, and two compressors. The liquid carbon dioxide escapes into each mould in turn through a very fine needle valve. As the liquid leaves the valve, a portion reverts to gas and the remainder of the liquid is cooled to a solid, collecting as a fine powder, or snow. The gas is drawn away from the moulds and recompressed to liquid by the recompressors, and this liquid is returned to the main storage. When the mould is full, the entire pressure of the liquid is turned on and the dry ice changes to a compact solid with a specific gravity of 1.35.

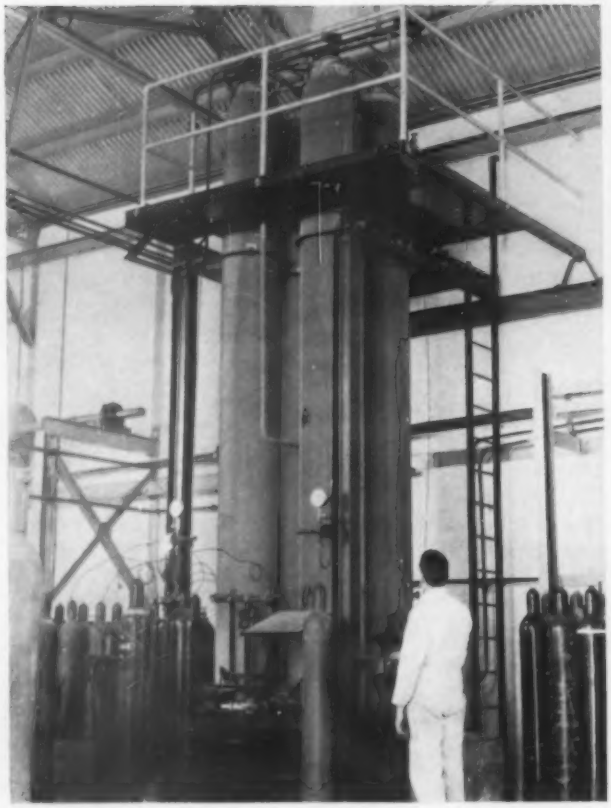


The CO_2 liquid bottle filling department, Mount Frome Lime Co.

The liquid is shut off, the gas remaining in the mould is allowed to diffuse back to the gas holder, and when the pressure in the mould has dropped, the bottom door is opened and the block of dry ice removed. The ice is then cut to the required sized blocks with a band saw. It is weighed, wrapped, and stored in a well insulated container for shipment. For country consumers the ice is packed in insulated canvas containers or "shippers." The loss in transit is remarkably small.



The dry ice moulds, showing a block of ice being removed from the bottom door



LEFT—The main liquid storage cylinders. Each of the four cylinders holds half a ton of liquid. RIGHT—Cutting a block of dry ice on an electric band saw

With this, as with any new departure in business, much pioneering has to be done, but the Mount Frome company has confidence in Australia and its potentialities, and is convinced of future prosperity of the lime industry and its allied interests.

Plant Will Be Rebuilt

A. J. SNYDER LIME AND STONE CO., Tillson, N. Y., is to rebuild its plant immediately, which was destroyed by fire recently with $50,000 damage.

Welding Textbook

THE LINCOLN ELECTRIC CO., Cleveland, Ohio, has published a book, "Lessons in Arc Welding," of about 130 pages, which was compiled to present in a concise manner certain fundamental facts of welding, the knowledge of which will enable the operator to use the welding process successfully and economically. Included in its pages are descriptions of the equipment, precautions and general instructions on how to make various kinds of welds with different materials. The types of welds are diagrammatically illustrated. The book is available for 50 cents. The Lincoln Electric Co., Cleveland, Ohio.

Bankruptcy Proceedings

THE TOPEKA SAND CO., Topeka, Kan., has filed a voluntary bankruptcy suit in federal court. When proceedings were started, the company had outstanding accounts past due amounting to $6,674.16.

The three absorption towers are a striking feature of the St. Peters plant

Production Up

ILLINOIS GEOLOGICAL SURVEY, (W. H. Voskuil and W. A. Newton, Information Circular No. 20) reports preliminary returns from producers of agricultural limestone in Illinois and adjoining states show that Illinois farmers applied approximately 1,022,916 tons to the soil in 1936. This preliminary total represents 95% increase over the 1935 total. The figures given below show that the steady increase in consumption of limestone by the farmers in this state since the low year of 1932. The total figured for 1936 is above that of all previous records, and it is probable that consumption will be even greater in 1937.

Year	*Tons*
1930	811,000
1931	266,886
1932	132,995
1933	190,963
1934	346,141
1935	523,256
1936	1,022,916

Reorganization

MARION GRAVEL CO., INC., Marion, Ind., has petitioned in federal court for reorganization under Section 77-B of the Federal Bankruptcy Act. The company is now in receivership.

• Reported •

By Geo. D. Roalfe
Los Angeles

WEST COAST ACTIVITIES

ONE-SCREEN PLANT — FOUR SIZES OF AGGREGATES

THIS PLANT is of a type that can be properly described as semi-permanent. Its construction was occasioned by Graham Bros., Inc., being awarded the contract to furnish approximately 60,000 tons of rock and sand in connection with the present major improvements of the Coast Highway. The improvements extend over a distance of 17 miles in San Diego County, California, between San Onofre and Oceanside, and are being constructed under the supervision of the state highway engineers.

The work includes portland cement concrete as well as asphalt mixes. The materials produced are delivered by truck to concrete mixers, asphalt plants, as well as small amounts for roadside use. Aggregates are being furnished to three contractors, Dave Ryan, and Barney Carroll, San Diego, and Woods and Bevanda, Los Angeles, who hold separate contracts for portions of the work.

The closest permanent plant operated by Graham Bros. is located near San Juan Capistrano, nearly 20 miles from the near end of these jobs. Only such material as was required for the foundation piers of the Santa Margarita Bridge and the relatively small amounts used in the structures on the Ryan contract were trucked from the Capistrano plant.

Before deciding to install a special plant to fill these orders, intensive exploration work was done on the Santa Margarita Ranch along the beds of the San Onofre and San Mateo Creeks. Materials found in the San Mateo Creek were not only more abundant but also contained a better balance between sand and gravel, also between the several sizes of gravel. The material is largely rhyolitic in character.

Plant

The plant finally used was one originally operated by Edward and Gilbert E. Hawley on the east end of the Metropolitan Water District Aqueduct and was known at that location as Hawley Plant No. 1. The units used at the San Mateo Creek location are the same with only minor modification. The plant superintendent is H. L. McMillan and the production manager of this and the other Graham Bros. plants is O. E. Kendall, with headquarters at Long Beach, Calif.

The raw materials are recovered from the creek bed by means of a 1-yd. dragline bucket operated by a Caterpillar gasoline-engine-driven American Gopher crane. Dug material is loaded into trucks and transported about 500 ft. up an earth ramp to a timber receiving hopper fitted with a rail grizzley. The plant side is cribbed with timber so as to present a vertical face. The earth ramp is wide enough to permit backing the truck to discharge its load directly over the rear end, then driving down the opposite slope.

Materials are fed from the receiving hopper by means of a reciprocating feeder driven through a V-belt drive by an electric motor to a 30-in. by 90-ft. main conveyor belt. This in turn discharges into a metal chute fitted with a reverse direction bar grizzley with 5-in. openings between bars. All gravel 5 in. and larger is fed into a 15-in. by 24-in. primary jaw crusher built by the Lewellyn Iron Works, Los Angeles. Materials passing the grizzley fall directly on to the receiving end of a 4-ft. by 16-ft. Symons vibrating screen fitted with three decks. The No. 1 or top deck is equipped with 10 ft. of 1-in. square mesh and 6 ft. of 3½-in. square mesh cloth, the No. 2 deck has 10 ft of ¾-in. square mesh and 6 ft of 1½-in. square mesh cloth, and the No. 3 deck or sand screen consists of 10 ft. of No. 3 mesh.

Four sizes of material are made, namely, sand through the No. 3 mesh, fine aggregate between the ¾-in. square and No. 3 mesh, medium aggregate between the 1½-in. square and the ¾-in. square and coarse aggregate between the 3½-in square and the 1½-in. square. The ten foot section of 1-in. square is used simply as a relieving screen and greatly increases the effectiveness of the fine aggregate and sand screening. Wash water is provided by vertical sprays the width of the screen and concentrated over the first 10 ft. of the screen.

The use of a one-unit screen to care for scalping operations and sizing is a new departure in the West. All materials except the primary crusher feed are handled by this unit, which is the only screen in the entire plant. Ordinarily only the rejects from the vibrating screen, or larger than 3½-in. square, are fed to the secondary crusher which is a 9-in. by 38-in. Roller Bear jaw crusher (Alloy Steel Co., Los Angeles). In operation it has been found advisable at times to divert all or a portion of the 1½-in. to 3½-in. material into the secondary crusher to balance the relative proportion of the various sizes of aggregates. The products of both crushers are fed by gravity on to a 24-in. by 90-ft. steel frame return conveyor. This return conveyor discharges on to the main conveyor and closes the dual crushing circuit with one conveyor belt.

Crusher and Screen Mounting

The method used in mounting the crushers and vibrating screens deserves particular mention. The crushers are located at opposite ends of the screen, all three units are mounted directly on two 18-in. steel beams. These in turn are carried on two concrete foundation piers directly under the two crushers. The piers are carried up about 10 ft. above the ground level giving ample clearance for all the necessary mechanical parts, none of which are submerged below ground level. Attached to the steel beams mentioned above are the supporting members of an operating deck which surrounds the screen and crushers with an extension at the secondary crusher end of about 12 ft. On this extension the main electrical switchboard, provided with a canopy, is located and all motor controls in the producing plant proper are centralized here. Due to the elevated position of this operating deck and switchboard, one man has all the producing units under observation and control, while at the same time he acts as screen and crusher operator.

Returning to our description to the vibrating screen and tracing the flow of the several products to storage; sand, or minus No. 3 mesh material, together with the wash water, flows into a two-compartment drag washer located on the ground. Washed sand is elevated on a 20-in. by 93-ft. belt conveyor carried on a steel frame and bents, to a draining storage pile. After draining for at least 24 hours, it is moved from its origi-

nal pile into stock pile, from which it is reclaimed and elevated to the batch bunker by a 20-in. by 70-ft. steel-frame conveyor. Gravel in the three sizes mentioned produced by the Symons vibrating screen is discharged by gravity to three 20-in. by 93-ft. steel-frame conveyor belts and elevated to respective bins in the batch bunkers.

Batching Plant

The batching plant consists of three hopper-bottom steel bunkers. These are mounted in a line. One of these units is subdivided by a partition used for sand and ¾-in. gravel; 1½-in. gravel and 3½-in. are stored in the remaining two bunkers. Total storage capacity of these bunkers is 600 tons. Batching is accomplished by means of a fully automatic, electrically-controlled, Johnson 1 cu. yd. batcher, consisting of four separate weigh hoppers. Two of these are suspended from the sand and ¾-in. gravel bunker, and one each on the other two bunkers. Adjoining the bunker is a timber cement platform elevated 4 ft. above ground. Cement is delivered in sacks, and a sufficient supply for a day's run is stored on this platform. A belt conveyor 30-in. by 109-ft. runs under the full length of the bunkers and the cement platform, and runs up and out approximately 25 ft. to gain head room for loading batch trucks.

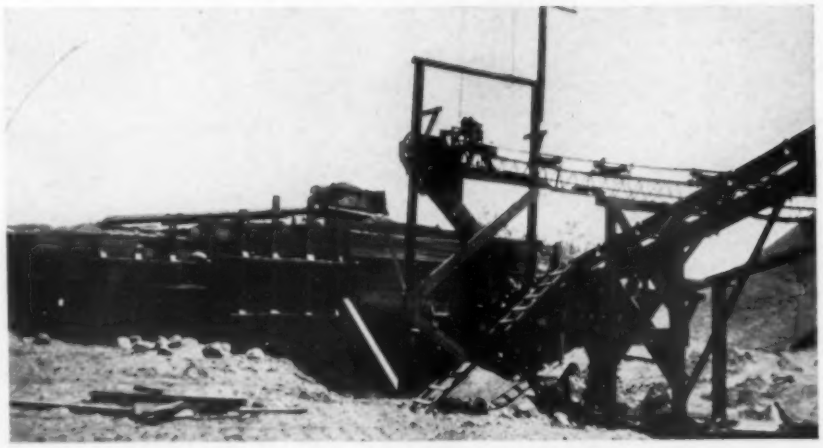
In loading a batch the automatic batcher is set for the desired weight, the contents of the four hoppers discharged on the moving belt beneath, and six sacks of cement added at the cement platform by loading them on to the conveyor through a hopper chute in the floor. The entire batch including the cement is then transferred by the conveyor to the batch compartment in the loading truck. No provision was made for varying the cement content of the batches as the highway specifications call for six sacks to the cubic yard of concrete. All adjustments in the batch mix are made by varying the weights of the aggregates. Electrical control is from switch load located near center of bunkers.

Stock Piling

A description has already been given of the method used for handling sand. Surplus gravel in any size above the batching requirements is drawn one size at a time from the bunkers and conveyed by the batching conveyor to trucks, and loaded similarly to batches. Reclamation from stock pile is by use of clam-shell bucket and crane.

Motor Drives

All units are individually driven by 3-phase 440-volt, a.-c., electric motors. All drives are V-belt. The motors in use at the present time are all Fairbanks-Morse or U. S. The power used is purchased.



Raw material truck ramp showing timber cribbing, main conveyor and discharge end of return conveyor

Two compartment sand washer with washed sand conveyor and drainage pile and lower end of sand recovery conveyor at extreme right

A general view of plant

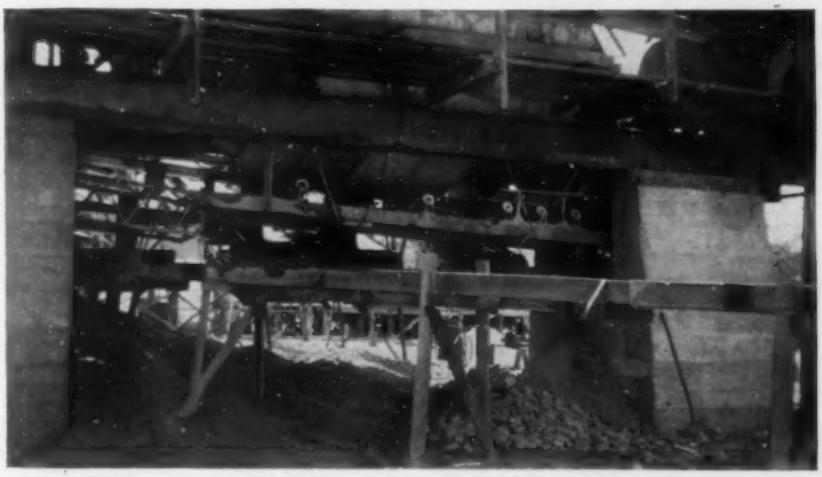
Water

Water used for washing is taken from the creek and pumped by a direct-driven centrifugal pump of 500 g.p.m. capacity. An adequate water supply being available no attempt is made to reclaim any wash water. The waste water is however discharged into shallow settling basins and permitted to percolate or filter back into the stream.

Capacities

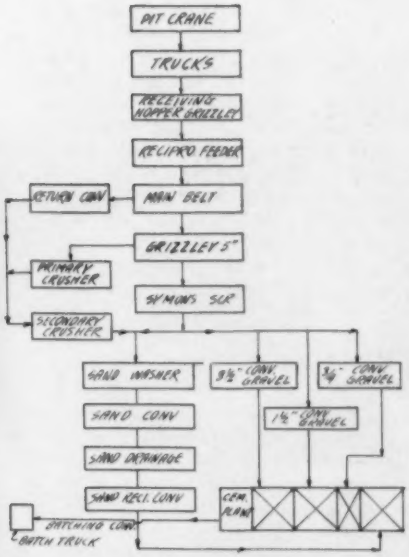
The rock plant proper has a capacity of 1000 tons per 8-hour day under average operating conditions. Batching experience to date indicates a safe capacity of 480 cu. yd. batches per day, the maximum allowed to be poured.

Three aggregate conveyors left to right ¾-in. gravel, 1½-in. gravel, 3½-in. gravel



View of crusher and screen supports

View of batch bunker showing sand recovery belt, sand drainage pile and sand conveyor



Flow sheet of plant

Improving Plant

INDEPENDENCE SAND AND GRAVEL CO., Salem, Ore., has been undergoing considerable improvement since the recent change in ownership. New bins are being erected, the office is being remodeled and the railroad spur is being extended. Work is under the supervision of C. C. Skinner.

New Small Plant

BEAR CREEK SAND AND GRAVEL CO., Medford, Ore., a new concern, recently started operations. The company, owned by Cass Wymore, will deal in sand, gravel, crushed rock and cement. Four acres of land were leased and a plant costing $5000 was built. Daily capacity of the plant is 200 cu. yd. of material.

Secondary crusher and discharge end of screen

Reconditioning Gravel Plant

UMPQUA RIVER NAVIGATION CO., Eugene, Ore., is overhauling its gravel plant to get out gravel for improvement of the Umpqua highway between Reedsport and Scottsburg. John Dolan is foreman.

Buys Gravel Firm

ATLAS OLYMPIA CO. OF CALIFORNIA, San Francisco, Calif., recently purchased the Arrowhead Gravel Co., San Jose, Calif. J. R. Cassidy is retained as manager of the plant.

Chemists' Corner

SOME EXPERIMENTS AND OBSERVATIONS ON

"Active Lime" and Puzzolanic Reactions in Portland Cements—PART III

By H. R. BRANDENBURG,
Cowell, Calif.

(Parts I and II of Mr. Brandenburg's article were published in ROCK PRODUCTS, *May and June, 1937, respectively.)*

Time Element in Hydration

For average cements it does not seem that hydration progresses very fast nor very far after the initial 30-day period; for instance, the previously cited cement paste at the end of a year's storage, in a closed system, showed an active lime content of only 11.80% CaO (in the form of hydrate).

Tests were also conducted on this same cement to show the effects of changes in water addition on active lime generation; the time cycle in these tests being 48 hours:

% Water	%* Loss	— Active CaO — As found %	On loss free basis %
22	16.36	8.28	9.90
27	17.65	8.77	10.65
32	18.56	9.03	11.06
37	19.26	9.42	11.67
42	20.08	9.68	12.14
50	21.30	10.06	12.77

* Total residual loss after alcohol treatment.

The solutions in which the plaques had been stored were also examined at various times; herewith are two of such results after 80 and 180 days' storage; results calculated on solids.

at 80 days		at 180 days
21.60%	SiO_2	21.72%
10.08	R_2O_3	9.86
62.93	CaO	63.43
94.61	Totals	95.01

Indicating that not merely lime dissolves, but that the dissolved products, in a closed system, are substantially those of the cement proper.

In the following described test, two types of cement were used, one a standard portland cement, the other a blended puzzolan-portland cement.

These plaques made from these cements, at the age of 20 days, analyzed as follows:

Portland cement "As is"	Portland cement Loss free basis		Puzzolan-portland cement "As is"	Puzzolan-portland cement Loss free basis
17.76%	21.34%	SiO_2	30.70%	36.74%
8.20	9.85	R_2O_3	6.70	8.06
54.72	65.77	CaO	43.27	52.07
1.09	1.31	MgO	.87	1.05
1.26	1.52	SO_3	1.32	1.59
16.77	....	Loss	16.84	....
99.80	99.79	Totals %	99.70	99.71
10.20	12.24	Active CaO	9.35	11.26

The two cements were kept in separate and sealed glass jars provided with suitable inlets and outlets for the passage of distilled water over the plaques; the carboys containing the feed water were kept under strong NaOH seal to prevent ingress of any CO_2, the rate of flow was held as nearly as possible to 1000 cc. per day per set.

Analyses were made once every 30 days; during the period of between the 93 and 101 days the solutions passed were saved, compounded and analyzed with the following results which are recorded in parts per million:

Portland Cement		Puzzolan portland
1000.	SiO_2	1351.
620.	R_2O_3	1160.
2545.	CaO	2162.

On the 277th day following manufacture and the continuous subjection to water, as described, the plaques were analyzed for the last time and the following results obtained:

Portland cement "As is"	Portland cement Loss free basis		Puzzolan-portland cement "As is"	Puzzolan-portland cement Loss free basis
17.52%	21.34%	SiO_2	30.78%	36.73%
8.36	10.18	R_2O_3	7.36	8.80
53.31	64.95	CaO	42.47	50.80
1.25	1.52	MgO	1.04	1.24
1.17	1.43	SO_3	1.40	1.68
17.81	....	Loss	16.30	....
99.42	99.42	Total %	99.35	99.35
11.45	13.93	Active CaO	7.87	9.39

Part Played by Silica

The fact that silica, or silicious materials, and lime react together when placed in an aqueous environment is so well established that the possibility of a puzzolanic action also, it would seem, can hardly be discredited by anyone.

It is quite true, of course, that such reactions at normal temperature and condition will be rather slow and of comparatively nominal extent by comparison with the speed at which they will completely react at elevated temperatures, but they do take place.

There is a confusion of mind, and it would appear that the confusion is between the purely chemical side of such reactions and the tangible physical manifestations thereof in the form of tensile, compressive or transverse strength; this strength development, if taking place at normal temperature and condition, being referred to as puzzolanic activity.

On the other hand it seems rather difficult to credit the generally made and accepted statement that "a suitable

puzzolanic material can be further improved by ACTIVATING the SILICA through ignition."

This conception appears so oddly at variance with all of the logically tenable considerations that it requires checking to prove its asserted validity.

Using finely ground Ottawa sand at 1800 cm.²/gr. as a substitute for a puzzolan, and trying it out repeatedly in its raw state and in the ignited form, together with portland cement in 1:3 standard Ottawa sand mortar mixes and storing in water, no material differences could be detected in either tension or compression tests.

When storing in 5% magnesium sulfate solution, the specimens made with the ignited sand were invariably of lower strength in both tension and compression.

These tests were run not only in duplicate each time but were twice repeated with about a six-month interval between tests; thus apparently ignition does not improve a straight silica.

The reaction between the Ottawa sand at the fineness given and hydrated lime under normal conditions is very slow, and of almost negligible extent, even after a year of contact.

Since the solubility of lime in water is very low, while the solubility of barium hydrate is relatively high, its use suggested itself for the purpose of speeding up a possibily occurring reaction between this alkaline earth hydroxide and silica.

With this in mind Ottawa sand grains whose diameter had been carefully ascertained under the microscope were immersed in a saturated solution of barium hydrate, the glass container filled nearly full and sealed off; after a year-and-a-half period the Ottawa sand grains were still of their original size and of unclouded appearance, but the strong base had attacked the glass and upon the walls appeared crystals of the hydrous barium silicate, which were absolutely perfect, some measuring up to 12 mm. in length and 4 mm. in cross-section.

A blank control test without any silica whatsoever showed the same effects and crystal formation, therein proving conclusively that the silica was derived from the glass and not the Ottawa sand grains; so much for that experiment and whatever moral it may hold.

Under autoclaving conditions, using the theoretically called-for amounts of lime and the finely ground Ottawa sand, it has not been found possible to fully effect the formation of the di-calcic silicate.

By supersaturating the system with respect to lime and by repeat treatments with intervening re-grinding and re-compacting, it has however been possible to prepare the di-calcic silicate.

The mixtures of the finely ground Ottawa sand and hydrated lime were compacted with the addition of a small amount of water in a miniature cupel mold, and prior to autoclaving; the autoclaved mass was quite dense, hard and very strong, appearing of crystalline texture throughout.

By contrast amorphorus silica appears to behave quite differently.

A silica gel was prepared from sodium silicate, the finally obtained and thoroughly purified silica, after air drying, showed a loss on ignition of 21%.

Reaction between this type of silica and hydrated lime in the presence of water is almost instantaneous and of considerable magnitude even at ordinary temperatures.

The following molar ratios were obtained for the time periods given, storage being in $Ca(OH)_2$ saturated water and in sealed containers; the dry mixture being in the proportion of the di-calcic silicate:

Ratio SiO_2:CaO.....	10 days	1.0:0.880
	40 days	1.0:1.310
	692 days	1.0:1.810

These specimens, like those of the preceding test, had been compacted in a cupel mold, but unlike the autoclaved sand specimen they failed to show any particular strength, even at the advanced age of 692 days, and could be crumbled away with the finger nail.

From these results alone one would conclude that the reaction between lime and a hydrous form of silica, such as orthosilicic acid, even at ordinary temperature and condition, is a pertinent one; but that the reaction products $SiO_2 \cdot CaO \cdot xH_2O$ are physically not particularly strong compounds; e.g., we have here, if you will, a form of puzzolanic activity, but minus the usual manifestation of a really pertinent strength development such as we accredit to a proper puzzolanic reaction.

The reaction $SiO_2 \cdot CaO$ plus water is a two directional one and the final products formed depend upon relative environments.

In an environment in which the base approaches or exceeds the theoretical requirement for the formation of di-calcic compounds, the end products will be in the direction of the example just cited.

If, however, these cylindrical specimens were to be introduced into a solution containing orthosilicic acid, the reaction would reverse with the ultimate formation of the mono-silicate.

These and findings of a similar character should be considered when we speak of lime fixation and puzzolanic action because the two are not necessarily synonymous.

We can have a large degree of lime fixation with but scant evidences of puzzolanic action, and conversely we can have a remarkable manifestation of puzzolanic activity with an equally remarkable low lime fixation to explain for it.

Working with mixtures of lime and the finely ground Ottawa sand it has been possible, under proper conditions and autoclaving, to produce specimens possessing most remarkable strength, some breaking as high as 600 lb./sq. in. in tension and 2600 lb./sq. in. in the transverse test; but, as previously stated, it is practically impossible with this type of silica to obtain any marked degree of strength, or to prove notable chemical activity with lime at the ordinary temperatures and conditions.

This relatively inert form of silica then could not be regarded as a suitable material for the demonstration of puzzolanic activity; yet, under autoclaving conditions its dense and crystalline structure will do that which the amorphous, hydrous and chemically highly active form of silica fails to do, namely, to yield products of strength when placed in contact with lime and water.

Thus, as appertaining to these two forms of silica, it would seem that neither could qualify as a suitable puzzolanic raw material.

The quartz type fails for lack of reactivity and the development of reasonable strength at normal temperatures.

The orthosilicic acid type, while endowed with ample reactive propensities towards lime at ordinary temperatures, yields only weak and essentially amorphous silicates.

These latter unquestionably possess some merit as void filling bodies, but in an environment of other high strength yielding components, would only serve to detract from the total strength and in proportion to the extent of their presence therein.

A chemical analysis of any of the so-called puzzolanic materials will always show silica to be the major percentage constituent but without regard to the manner of its existence.

Thus the mere fact that so-and-so percent of silica is present does not mean a thing from a puzzolanic value standpoint, though it would from an autoclaving standpoint.

Other Active Minerals

The next prime constituent in the vast majority of naturally occurring rocks and mineral materials, both igneous and sedimentary, is alumina with iron, magnesia, etc., following.

All of these have been investigated with regard to their reactivity towards lime and combinations have been formed between various forms of alumina and iron with lime.

Some forms of alumina have been

found highly reactive and none failed to show at least measurable activity with lime; even corund shows a marked reactivity with lime under autoclaving conditions.

Some aluminum silicates react with more difficulty; the most refractory thus far found being the double silicate of alumina and beryllium-beryl.

In practically all forms of alumina and most aluminum silicates, the degree of reactivity with lime was very markedly depressed after ignition; generally speaking, the higher the temperature the lower the activity.

Efforts were also made on the formation of magnesian silicates; theoretically proportioned mixtures of pure silica and magnesium oxide were compacted as hereinbefore described and autoclaved.

Due, first, to the formation of magnesium hydrate, the volumetric expansion became so great as to rupture the test pieces; but, by re-compacting the mass and again subjecting to the action of steam in an autoclave, the formation of magnesian silicates was easily accomplished.

Thus in sand-lime-brick manufacture the use of limes high in magnesia content may work out to the detriment of the product.

Puzzolanic tests run at normal temperature, at slightly elevated temperatures, and the relative evaluation of puzzolanic activity on many silicious materials under autoclaving conditions, have yielded a mass of information which has resulted in certain definite conclusions and some tentative theories.

More recently still, this prior information has been augmented by the results obtained on several hundred tensile and transverse specimens, which had been preformed under a pressure of 5000 lb. per sq. in., and then stored under varying conditions of moisture, temperature and autoclaving.

The outstanding consideration arrived at is the conviction that the theory that the "silica" in a naturally occurring raw material endowed with puzzolanic qualities can be further "activated" through ignition is a fallacy; it is true that the tenor of the puzzolanic activity is improved by calcination, but not for the reasons given.

A raw material showing puzzolanic properties will always show a higher degree of lime consumption (or fixation) prior to, than it will after ignition; and herein, I believe, lies the answer why the ignited material will show a higher puzzolanic quality than the raw.

For, as we have learned, the hydrous forms of silica, alumina and iron, for the experimental conditions cited, will readily yield combinations with lime of infinitely varying compositions, but always of low strength value.

As we destroy these parasitic hydrous combinations we obtain denser and less reactive products, if gauged by the lime consumption (or fixation) only; but on the other hand we gain in what is termed puzzolanic value, e.g., strength.

Conclusions

Then what is puzzolanic activity, and how does it come about?

The answer to that riddle is still far from complete; and when one considers the phenomenal strength effects obtainable from suitably selected puzzolans and lime one must marvel indeed at the small lime requirement necessary to effect it and to accomplish so much work.

It must be then that in the particular base type of crystalline structure that we deal with in certain crystalline combinations of silica-iron and alumina, which are susceptible — in a relative sense — to attack by lime, we find the nucleus of strength upon which our so-called puzzolanic activity rests.

We can conceive of a superficial reaction of lime upon the grains of amenable crystalline silicates, and the formation of hydrous silicate-lime compounds upon the faces of still unimpaired crystalline cores and the bonding of core to core by this interfacial gel into dense and hard masses.

With such an explanation we could reconcile the really enormous manifestations of strength development when compared to the relatively small lime requirement necessary to effect it.

The amount of active lime actually fixed by the addition of a puzzolanic material is apparently a relatively small one under normal conditions of application and storage; the ultimate possible value of fixation is apparently only obtainable under autoclaving conditions; that is, by the application of temperatures higher than we will ever find them in a concrete mass.

Notwithstanding this, measurable increases in strength are obtainable by the addition of a puzzolanic material to a portland cement, and this despite the relatively low lime fixation evidenced.

Not only that, but portland cement pastes containing a puzzolan prove more impermeable and hence more resistant to an ingress of solutions unfavorable to an unimpaired existence of a concrete mass.

Bearing in mind certain well established limitations, the puzzolan-portland cement has carved for itself a certain well-deserved place in certain types of mass construction; also for masonry mortar and stucco work.

Considering the large percentage inclusions of puzzolanic materials in the average puzzolan-portland cement, it would seem that it is just as well that its reactivity appears to be of rather limited extent, for one might contemplate with concern the results of a complete conversion to hydrous silicates in a static mass; if it were to progress up to the very end.

There appear to be several humorous side lights to the recommendations for the use of puzzolanic materials, however; for when we compare the modern trend of cement compositions with the recommendations for the addition of puzzolanic materials, we arrive at the somewhat paradoxical situation where we discountenance the presence of the alumina in the one and require its presence in the other.

Again, the higher limed our modern cements the greater the danger of hidden unsoundness and the greater the liberation of active lime in the cement paste.

Not content with this, by decreasing our alumina content in the cement we also deprive it of a corresponding portion of our gels, e.g., the protective membrane that guards against efflorescence on one side and permeability on the other.

From all of which it would almost seem as though we were trying in joining both extremes instead of pursuing the safer middle course based upon performance of the more established compositions in concrete work well done.

Publication on Cements

CEMENT PROCESS CORP., New York, N. Y., has published booklet No. 1, illustrating the uses of the new cements manufactured by the Blank process. The subject is covered under two headings: masonry cements, for bricklaying, plastering and stuccoing; and special cements, for all-purpose concrete constructions. Test data on chemical analyses and strengths are included, with listings of advantages claimed.

Improves Plant

OLYMPIC PORTLAND CEMENT CO., Bellingham, Wash., is installing individual coal mills for direct firing on each of its three kilns.

Correction

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., plant described in ROCK PRODUCTS, May, 1937, issue, pp. 47-51, uses a 6-in. Fuller-Kinyon Cement pump for transferring cement from silos to packing bins, not a 4-in. pump, which would not have the capacity required for this service. It was also stated that the kilns had been speeded up from 48 revolutions per minute to 54. It's obvious, of course, that "minute" should be "hour" in this case.

John J. Porter, President North American Cement Corp., Chairman Committee on Accident Prevention and Insurance, Portland Cement Association

John J. Porter's

PHILOSOPHY

Of Accident Prevention And Industrial Relations*

THOSE to whom I am speaking are practical safety men and know much more than I do about the practical business of making our plants safe places in which to work. I am, therefore, forced to fall back on generalities and philosophical reflections.

Different individuals may have different reasons why they are interested in the safety movement, but I believe most of us have pretty much the same point of view, and I am going to try to develop our real reason for safety-mindedness by a process of elimination.

The first reason that occurred to me was that of financial saving. The aggregate cost of accidents is very great and in the interest of efficiency we are all of us anxious to save this cost. However, I believe that this is a very minor motive in the minds of most of us. Certainly with me, I could not possibly justify giving any considerable time to safety work on the basis of the financial savings to my company.

The second thought that occurred to me is the importance of saving human life. At first this looks like a matter which should appeal to everyone, and you may be somewhat shocked when I tell you that on careful examination I found that in the abstract, the saving of life did not appeal to me as particularly important.

There are said to be over two billion human beings living on this globe; and within fifty years most of them will be dead. Fifty have died while I have been making this statement. In comparison with this vast total, the few deaths that can be put off for awhile by accident prevention work look very unimportant. It comes back to this: that while life is precious to the individual, in the abstract it is a very common ordinary thing.

Moreover, we know very little about that state which we call "death". We do know that life is full of troubles and it may well be that those who die are much better off. As Ecclesiastes has it: "Therefore, I hated life; because the work that is wrought under the sun is grievous unto me; for all is vanity and vexation of spirit."

My next thought was that perhaps the prevention of disabling accidents and the elimination of the pain and suffering attendant upon such accidents was more important than the prolongation of life itself. However, even this idea does not stand up well on analysis. If we avoid early death, we automatically experience the disabilities of age.

This is the normal course of life. Pain and suffering are something to be avoided when possible, but experience with them seems to be a necessary condition of this life and something which we should learn to bear with courage.

I think we are now getting somewhere, however. It is true that mere physical pain is something inevitable and to be borne with courage, but it is also true that suffering cuts much deeper than that, and that an accident involves, besides pain to the individual, anxiety for loved ones and anxiety by them for the injured. In many cases, there is a great deal of collateral suffering, sacrifice of comforts and necessities, financial losses, indirect hardships and adverse results that are difficult to measure. The flood waters of life may be deeply disturbed by even a single accident and the ever-widening ripples may affect the happiness of many lives, even unto future generations.

Pat was right, when he gave his six reasons for working safely as, "Me self, me wife, and the four little Murphys."

Yes, I think we have it now. The reason we are interested in safety is because accidents destroy happiness and are evil, while safety work is one way to increase happiness and is good. Human happiness is the all-important thing.

It is true, as Dr. Fosdick says, that happiness is more dependent on the inward interpretation than on the outward fortune, but it is at least easier to preserve a satisfactory attitude of mind if the outward conditions of life are reasonably satisfactory.

Having come to this conclusion, my mind is now clear on another question which has more or less puzzled me. I have always felt that under some circumstances it is not becoming to a man to think too much of his own life and limb. We all despise cowards and we all admire the hero who has risked his life for an ideal, or for another. The old saying, "Who holds life dear, pays too dear for life," appeals to me and these sentiments, superficially, would seem to conflict with our safety movement.

Actually, if we recognize the real philosophy back of our work there is no conflict. If our real objective is to increase happiness, it becomes not only proper but highly commendable to risk life and limb for this same great motive. This, I think, is recognized in the quotation, "Greater love hath no man than this, that he lay down his life for his friend."

We are given a body, a machine, through which the real inner self must manifest itself and do its work. We should treat this machine fairly and wisely, not over-rating its importance but attempting to do the best possible job with it before it finally wears out. If I should jump into the river to save a child and should drown this body, I would have done a commendable thing because my objective was sound and good. But, if I should drown it through rocking the boat to show off my indifference to danger, I will have done a very foolish and even a wicked thing.

* Extracts from talk to Regional Safety Meeting of Portland Cement Association, Baltimore, Md., May 26, 1937.

Industrial Relations

One other thought, and I am through. If we believe in this philosophy of safety, we should be sympathetic with other means of decreasing suffering and increasing happiness and there are many of them. Probably the greatest single cause for human suffering is war, with all the direct and indirect sacrifices and consequences resulting. The direct results are well understood, the indirect results less so. The five-year depression from which we are just emerging was felt in every country on the globe and affected practically every one of its two billion inhabitants. It was probably the greatest depression the world has ever known and was a direct consequence of the greatest war the world has ever had.

In our own sphere of work, if we believe in this philosophy of safety, we should be good industrial relations men. Our relations between management and workmen should be conducted on a thoroughly human basis. Our dealings with each other should be humane. We should avoid dissension and we should endeavor to offset the efforts of those enemies of mankind who are preaching the devil's gospel of hatred. Good safety men should also be good workmen, good foremen, good neighbors, good citizens, and, whether they realize it or not, good Christians.

June No-Accident Campaign of the Portland Cement Association

THE ELEVENTH June no-accident campaign of the Portland Cement Association got into action on May 15 with more punch and a promise of more enduring safety stamina than in any previous year.

On May 17, a giant petition of 22,368 cement workers, asking the Association to conduct the drive, was presented to the Association's Committee on Accident Prevention, assembled at its meeting at New York. On May 19, the petition was canvassed by a select committee, consisting of Adam L. Beck, president, Great Lakes Portland Cement Corp.; John J. Porter, president, North American Cement Corp., and George S. Bartlett, dean of the staff of the Association, and the big drive against accidents was on in earnest.

The general program, which appears in an adjoining column, indicates the remarkable continuity and methodical preparation with which the drive moved forward. A special feature was prepared for and is being employed by almost every individual mill almost every working day of the month. Two miniature newspapers, a series of general posters, and 112,000 pages of mimeograph and multigraph matter, more than one-half of the Association's entire output of the latter material since January 1, are listed among the items prepared and mailed to the mills from Association headquarters within 30 days on the one subject of this campaign alone.

A new safety flag was designed and dedicated to the objects of the campaign with impressive ceremonies at 150 mills on the morning of June 1. Great mass meetings were held the equal of similar meetings back in pre-depression days. Local contests for good housekeeping, prize-winning slogans and cartoons, "Safetygrams," model safety meetings, thorough inspections and special days featuring falls, eye protection, quarry safety, and safe driving, were among the features that have helped to make the campaign the most interesting and productive to date.

Favorable Newspaper Mentions

Local newspapers in one cement plant city gave the drive one or more columns of first page space for ten successive days. No activity of the industry has ever produced an equal volume of news mention in so brief a space of time.

Flag raising at Cape Girardeau plant of Marquette Cement Manufacturing Co.—New design of safety emblem

PROGRAM OF EVENTS

Week of May 17	*General meetings of all plant safety committees to consider and discuss plans for the campaigns.*
May 17-22	*PERSONNEL WEEK, for superintendents and department heads. Superintendents will receive detailed letter on subject about May 14.*
May 24-29	*SPOTLESS PLANT WEEK. At its meeting on May 17, General Safety Committee should arrange for a special committee in each department to see that latter is brought up to the highest possible standard of cleanliness and orderliness, in preparation for June campaign. Special circular on this subject will reach superintendents about May 19.*
Monday May 31	*PLANT MASS MEETINGS. All plants should arrange for either general plant or departmental mass meetings to push the June campaign. Make them brief but peppy. Discuss the purposes of the campaign. Announce your plans. Arrange that as many men as possible participate. If you arrange a general plant meeting, secure the best available local speaker to encourage the men and create enthusiasm.*
Tuesday June 1	*FLAG RAISING. Place our fine new safety flag on your plant pole at sunrise June 1. Why not put this feature in the hands of a committee and have the employee with the longest service put up the flag? Full particulars will reach you in a circular about May 20. Arrange in advance if necessary to have flag flood-lighted for benefit of night crews.*
Wednesday June 2	*Andy Seezit. Surprise feature. What did he see? Every man may try his hand at coaching Andy.*
Thursday June 3	*Receive Safetygrams for posting on plant bulletin boards.*
Saturday June 5	*Distribution of the campaign newspaper.*
Monday June 7	*Episode No. 1. The Great Cartoon Derby. Who will win?*
Tuesday June 8	*Inspection Day. Watch for score card and information.*
Wednesday June 9	*Departmental Safety Meetings. Special Subject: Falls.*
Thursday June 10	*Receive Safetygram for posting on plant bulletin boards.*
Saturday June 12	*Safe Driving Day—Information coming.*
Monday June 14	*Meet Andy Seezit Again!*
Tuesday June 15	*Inspection Day.*
Wednesday June 16	*Model Safety Committee Meeting. Special Subject: Eye Safety.*
Thursday June 17	*Episode No. 2, the Great Cartoon Derby.*
Friday June 18	*Receive Safetygram "At the half-mile post."*
Saturday June 19	*Quarry Day. Mass meetings in all quarries.*
Monday June 21	*Andy Seezit! A persistent fellow.*
Tuesday June 22	*Inspection Day.*
Wednesday June 23	*Departmental Safety Meetings. Subject: Recent fatal accidents.*
Thursday June 24	*Distribution of campaign newspaper.*
Saturday June 26	*Receive Safetygram.*
Monday June 28	*Andy Seezit. What did he see last week?*
Tuesday June 29	*Inspection Day.*
Wednesday June 30	*General Mass Meeting.*
Saturday July 10	*Announcement of June results.*
Thursday July 15	*Awarding of "perfect" month certificates to winning mills.*

Among well known leaders who coöperated on various features of the drive are W. H. Cameron, managing director, National Safety Council; Daniel Harrington, chief of the safety division, U. S. Bureau of Mines; A. B. Sunderland, secretary, Ash Grove Lime and Portland Cement Co.; W. H. George, secretary, Cowell Portland Cement Co.; W. A. Wecker, president, Marquette Cement Manufacturing Co.; W. S. Speed, president, Louisville Cement Co.; Daniel Baker, Jr., vice-president, Standard Lime and Stone Co.; Blaine S. Smith, president, Universal Atlas Cement Co., and Joseph S. Young, president, Lehigh Portland Cement Co.

Supplementary Activities

Among mills which organized local supplementary activities may be mentioned briefly the Lehigh Portland Cement Co., Mason City, Iowa, which interested the entire community, including 30 local industries, in joining the campaign, and Marquette Cement Manufacturing Co., at Cape Girardeau, Mo., which put its safety drive in "high" with a great testimonial meeting in honor of its veteran vice-president and works manager, Richard Moyle, Sr. There is scarcely a mill that did not organize one or more individual features.

Breaking Records?

A check-up on results at the halfway point of the campaign indicated that it had smashed all records for the first 15 days of June, with an all-time low of only 3 lost-time accidents throughout the industry for that period. The best previous record for the first half of June was made in 1933, with operations and exposure about two-thirds the estimated volume for June, 1937, but with 6 lost-time accidents.

So the results for the first half of the campaign speak for themselves. In the next number of ROCK PRODUCTS we will announce the finals and present some of the other interesting features of this campaign, which is undoubtedly unique in the entire field of industrial accident prevention, and annually brings the cement industry a large quota of good will along with its direct benefits in the saving of life and limb.

Cement Standards Asked

FLORIDA is taking under consideration a proposal by members of the state senate to set up minimum standards to be defined by the highway department for all cement to be sold in the state. One of the reasons given by sponsors of the bill is the inferior quality of foreign cements imported into the state.

Bill Killed

WISCONSIN state assembly, on June 10, defeated by a vote of 53 to 36 the proposal of Assemblyman Ben Rubin to appoint a committee to study the feasibility of operating a state-owned cement plant.

Escorted Tour

UNIVERSAL ATLAS CEMENT CO., Chicago, Ill., recently was host to a group of Chicago Rotarians on an inspection tour through its Buffington, Ind., plant. The trip was part of a general program of the Chicago Rotary Club to become acquainted with its various members' industries.

HINTS AND HELPS FOR SUPERINTENDENTS

Adapting New Devices

PLANT OPERATORS in many cases are not so familiar with recent developments in contractors' earth-handling equipment as perhaps are those in the far west, where large grading jobs are common. A good example of the adaptation of a piece of earth-handling equipment to a commercial sand and gravel operation is furnished by the Metropolitan Construction Co., Denver, Colo.

This company operates a semi-portable sand and gravel plant having a capacity of about 50 cu. yd. per hour. Stripping and all excavating and moving of raw material from pit to plant is done by a Caterpillar 40-hp. Diesel-powered tractor hauling a 52-cu. ft. Killefer fresno. The fresno discharges from a control at the driver's seat to a grizzley-barred hopper, feeding a belt conveyor to the screening plant. The Caterpillar straddles the hopper, passes on, and returns for another load.

The average length of haul is about 400 ft. When the haul exceeds this, a night operator is put on the Caterpillar to move material for the next day's operation to near the hopper. Stripping is also often done at night, so that the full value of the device is utilized.

Tractor and fresno adapted for use in a sand and gravel operation

Crawler Rollers

By ROSS WHEELTON,
Aldershot, Ont.

ON MANY CRANES and excavators the crawler rollers are designed as are the two at the left of Fig. 1, with holes cored out at regular intervals forming spokes. This type of roller is no doubt satisfactory on machines working under normal conditions, but our experience has been that when working on service where severe shocks are encountered, as is usual when traveling constantly over rough solid rock like a quarry floor, these spokes tend to crack and the roller break up long before it is worn out, as can be seen at the right of Fig. 2.

We overcame this trouble by making replacements with a roller we had made at a local foundry. A pattern was made leaving the spaces between the spokes fully webbed as at the left of Fig. 2. As a trial, six castings were made, after a sample of steel obtained from one of the broken rollers was analyzed. These six were machined and some of the original rollers replaced with the new ones.

A check was made on these new rollers after a period of service that would have been sufficient to show cracks in the spokes of the standard type, but no cracks were in evidence. In addition the cost was much less than standard replacements, even figuring the cost of the pattern on the first six.

Storage Expansion

A PROBLEM not infrequently met is expansion of ground storage facilities in a necessarily restricted space The layout herewith is an interesting solution of the problem as developed by the Missouri-Illinois Material Co., St. Louis, Mo.

The unloader crane on the river front feeds a belt conveyor which runs over a ground storage, with a center division wall. From this overhead conveyor material is chuted at right angles either way, according to size being handled. The overhead conveyor extends beyond the ground storage to concrete truck- and car-loading bins.

To extend the ground storage, parallel to the railway tracks, which was the only way it could be extended, a new cross conveyor was built on a cantilever frame under the main unloading conveyor, extending 40 ft. on each side. It runs in either direction. This permits the main conveyor to discharge to it and to drop the material far enough from the central partition wall to permit a drag scraper to be operated from a platform on the cantilever frame. By use of A-frame anchors at each end of the storage pile the scraper bucket can extend the storage in either direction, and to recover it by the same method.

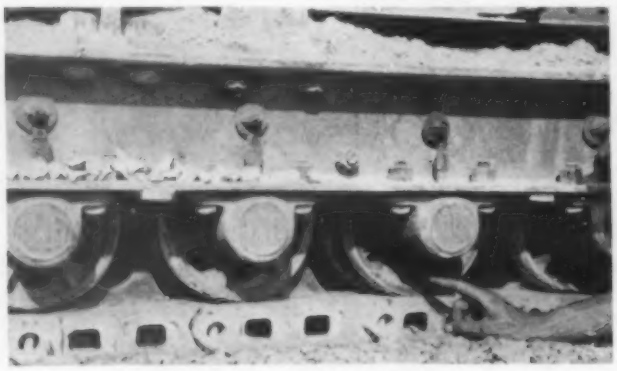


Fig. 1—Ordinary crawler rollers, showing spoke-forming holes

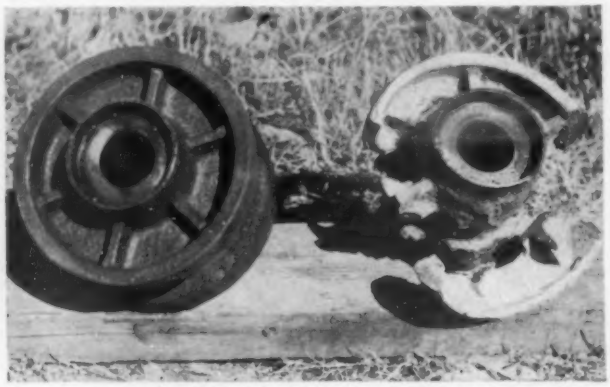
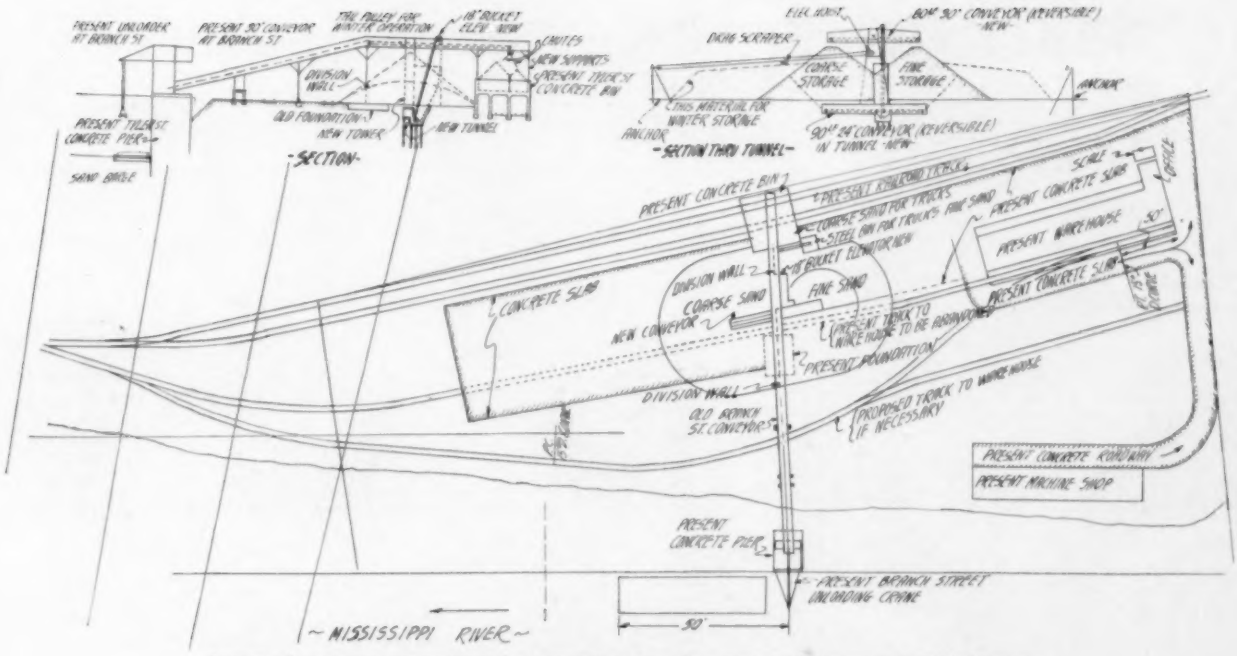


Fig. 2—Fully-webbed type of crawler roller for rough wear



Layout of conveyor arrangement for expanding ground storage facilities in a restricted space

To fill the car-loading and truck bins from this ground storage an 18-in. bucket elevator has been installed in a concrete well or housing, to the right of central dividing wall, the boot of which is fed by a reversible belt conveyor extending longitudinally under the center lines of the storage materials, as shown in the sectional sketch.

Old conveyor belts make good roofing

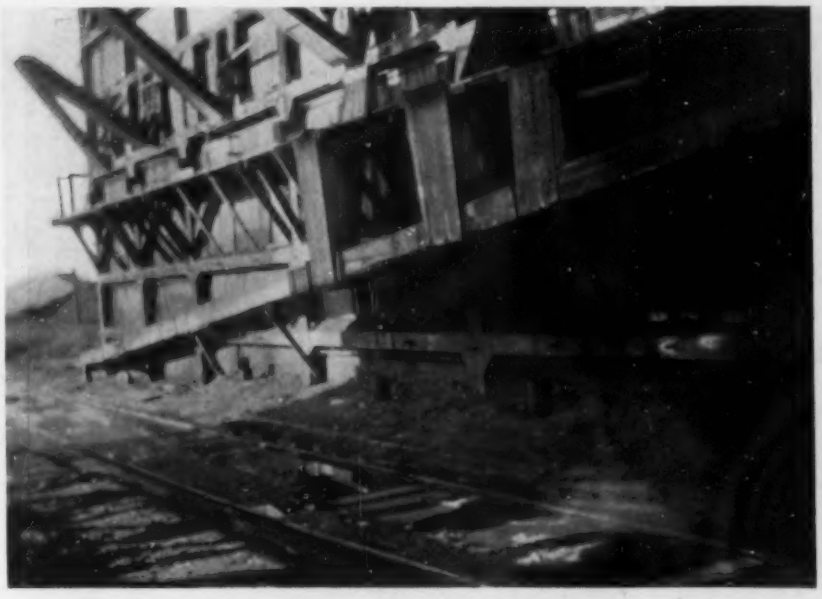
Use for Old Belts

OPERATORS are always interested in various ways of using up discarded equipment profitably, so here is a suggestion for the use of old belts—as roofing for sheds and buildings about the plant. The belting can be laid up one side of a peak roof and down the other, as shown in the accompanying picture. Or it can be laid lengthwise of the roof. In either case, a lap of 2 or 3 in. should be allowed. When laying the belting lengthways of a roof, the work should be started at the eaves and carried toward the ridge, as is done in shingling. Such a roof will provide good protection for buildings housing motors, crushers, shops or similar equipment.

Flume for Drip Water

AT MOST gravel washing plants, there is a considerable amount of drip water from the bins, which flows down the chutes and collects in pools and mud holes around the plant. A plant recently observed has been equipped with a simple device which largely eliminates this water. A long sloping flume has been constructed against the side of the plant, directly under the chutes, so that when water drips through the bin gates, it falls into the flume and is carried away from the plant.

The flume does not project out any farther than the walkway under the chutes, so that it does not interfere with the free movement of cars beside the bins. Small vertical boxes may be used to convey the water through the walkway from the gates to the flume, as is shown at the right of the accompanying picture, or small slots can be made in the walkway to permit the water to drop to the flume, as is the case at the left of the picture. A flume of this kind will do much to increase efficiency and safety around the plant.



A long, sloping flume at side of plant under chutes carries away drip water

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividends	
Aetna P. C., cap.[51]	6-22-37	16	..		
Allentown P. C. (Penn.), com.[51]	6-22-37	OW	..		
Allentown P. C. (Penn.), 6% cum. pfd.[51]	6-22-37	9½	..		
Alpha P. C., com.	6-22-37	24½	24¾	actual sale .25	June 25
American Aggregates, 1st mtg., 3/6's 1943, new bonds[48]	6-16-37	55	..		
American Aggregates, 6's, 1943, old[48]	6-16-37	53	..		
American Aggregates, com.[48]	6-16-37	3	4½		
American Aggregates, pfd.[48]	6-16-37	16	..		
Arundel Corp., com.	6-17-37	21½	actual sale	{ .25(qu.) / { .25(ex.)	July 1 / July 1
Ash Grove L. & P. C., com.[51]	6-22-37	13½	..		
Ash Grove L. & P. C., pfd.[51]	6-22-37	97	..		
Bessemer L. & C., com.[48]	6-16-37	7½	9		
Bessemer L. & C., pfd.[51]	6-22-37	96F	..		
Bessemer L. & C., 1st 6½'s, 1947[48]	6-16-37	96	..		
Bessemer L. & C., 6's, 1955[48]	6-16-37	97½	99		
Boston S. & G., com.[37]	6-16-37	1½	3		
Boston S. & G., 7% pfd.[37]	6-16-37	10	14		
Boston S. & G., 7's, 1939[37]	6-16-37	80	..		
Calaveras Cement, com.[60]	6-14-37	7⅝	8½		
Calaveras Cement, 7% pfd.[60]	6-14-37	77	..	2.00	June 30
California Art Tile, A[9]	6-15-37	18½	19½		
California Art Tile, B[9]	6-15-37	4	5		
Canada Cement, com.[42]	6-17-37	16	17		
Canada Cement, pfd.[42]	6-17-37	103	..	1.00	June 21
Canada Cement, 4½'s, 1951[42]	6-17-37	103¼	104½		
Canada Crushed Stone, 5½'s, 1944[42]	6-17-37	101	..		
Carolina P. C., 8% cum. pfd.[51]	6-22-37	40	7¼		
Consol. Cement, A	6-22-37	6	..		
Consol. Cement, 1st 6's, 1950[50]	6-16-37	82½	83½		
Consol. Okla. S. & G., 6½'s, 1948[42]	6-17-37	32	..		
Consol. S. & G. pfd.	6-18-37	47	65		
Consol. Rock Products, units[50]	6-16-37	1	2		
Consumers R. & G. 1st Mtg., 6's, 1948[53]	6-22-37	34F	37F		
Coosa P. C., 1st 6's[51]	6-22-37	49	..		
Coplay Cement Mfg., pfd.[50]	6-16-37	12	15		
Coplay Cement Mfg., 6's, 1941[50]	6-16-37	92	..		
Cumberland P. C., units[51]	6-22-37	54	..		
Dewey P. C., com.[51]	6-22-37	63	..		
Dolese & Shepard	6-17-37	41	43		
Federal P. C., 5's, 1947[53]	6-22-37	60	..		
Federal P. C., 6½'s, 1941[48]	6-16-37	60	..		
Fla. P. C., units[50]	6-16-37	35	37		
Fla. P. C., 6½'s, 1937[46]	6-16-37	99½	..		
Giant P. C., com.[50]	6-16-37	3	4		
Giant P. C., pfd.[50]	6-16-37	17	18½		
Glens Falls P. C., com.[51]	6-22-37	13	18		
Glens Falls P. C., pfd.[51]	6-22-37	85	93		
Great Lakes P. C., B[51]	6-22-37	½	..		
Gyp., Lime & Alabastine	6-14-37	12¼	actual sale		
Gyp., Lime & Alabastine, 5½'s, 1948[62]	6-17-37	101¾	102½		
Hawkeye P. C., cap.[50]	6-16-37	32	35		
Hercules Cement, com.[50]	6-16-37	98	100		
Hercules Cement, pfd.					
Hermitage P. C., com.[51]	6-22-37	15	..		
Hermitage P. C., pfd.[51]	6-22-37	103	..		
Ideal Cement, com.	6-22-37	74	81		
Kelley Island L. & T.				.40	June 30
Ky. Rock Asphalt, 6½'s, 1936[60]	6-16-37	40	42		
Ky. Stone Co., v.t.c.[46]	6-16-37	4	..		
Ky. Stone Co., 5%, 1956[46]	6-16-37	45	..		
Keystone P. C., pfd.[51]	6-22-37	31	..		
Lawrence P. C., com.	6-12-37	37½	39½		
Lawrence P. C., 5½'s, 1942[50]	6-16-37	100½	..		
Lehigh P. C., com.	6-22-37	3½	actual sale	.37½(qu.)	Aug. 2
Lehigh P. C., 4% pfd.	6-17-37	..	180	1.00(qu.)	July 1
Lone Star Cement, com.	6-22-37	54	actual sale	.75(qu.)	June 30
Louisville Cement	6-19-37	200	actual sale		
Lyman-Richey, 1st 6's, 1939-40[51]	6-22-37	65	..		
Marbelite Corp., com.[46]	6-14-37	½	¾		
Marbelite Corp., pfd.[46]	6-14-37	4	5		
Marblehead Lime, 7's, 1944[44]	6-16-37	93	96½		
Marquette Cement, com.	6-25-37	44	47		
Marquette Cement, pfd.[50]	6-16-37	105	110		
Material Service Corp.[50]	6-16-37	19	21		
McCrady-Rodgers, com.[50]	6-16-37	6	10		
McCrady-Rodgers, 7% pfd.[50]	6-16-37	..	37		
Medusa P. C., com.[51]	6-17-37	44	46		
Medusa P. C., 6% cum. pfd.	6-22-37	88	..		
Michigan L. & C. com.[51]	6-22-37	88	..		
Minnesota Mining & Mfg. Co.	6-16-37	39	actual sale		
Missouri P. C.	6-22-37	19½	20½	.50	June 30
Monarch Cement, cap.[53]	6-22-37	99	..		
Monolith P. C., com.[9]	6-15-37	3¼	4		
Monolith P. C., 8% pfd.[9]	6-15-37	7¼	7⅝		
Monolith P. C., 1st mtg.[9]	6-15-37	103	105		
Monolith Portland Midwest, pfd.[9]	6-15-37	3¼	3⅝		
National Gypsum, A., com.	6-22-37	13	actual sale		
National Gypsum, 7% pfd.				1.75	July 3
National Gypsum, 5% pfd.	6-25-37	17	18	.25	July 3
National L. & S., 6½'s, 1941[46]	6-16-37	95	..		
Nazareth Cement, com.[50]	6-16-37	9	11		
Nazareth Cement, 7% pfd.[50]	6-16-37	90	..		
Newaygo P. C., pfd.			..		
New England Lime, units	6-16-37	18	20		
N. Y. Trap Rock, 6's, stamped, 1946	6-17-37	84⅞	..		
N. Y. Trap Rock, 7% pfd.[46]	6-16-37	60	..		
North Amer. Cement, 6½'s, 1940[50]	6-16-37	84	..		
North Amer. Cement, 6½'s, 1943[50]	6-16-37	98	99		
North Amer. Cement, 1st 6½'s, 1953[50]	6-16-37	55	56½		
North Amer. Cement "A" pfd.[50]	6-16-37	9½	10½		
North Amer. Cement, com. A[50]	6-16-37	6	7		
North Amer. Cement "B" pfd.[50]	6-16-37	13¼	..		
North Shore Mat., 1st 6's[50]	6-16-37	52	..		
Northwestern P. C., units[9]	6-15-37	76	80½		
Northwestern States P. C.[51]	6-16-37	24½	26½		
Ohio River S. & G., com.	6-19-37	1	actual sale		
Ohio River S. & G., 1st pfd.	6-19-37	78	actual sale		
Ohio River S. & G., 2nd pfd.	6-19-37	5	actual sale		
Ohio River S. & G., 6's[46]	6-16-37	5	..		
Oregon P. C., com.[60]	6-14-37	4¼	5½		
Oregon P. C., 1st pfd.[60]	6-14-37	98	..		
Oregon P. C., conv. pfd.[50]	6-16-37	55	57½		
Pacific Coast Aggr., new com.[60]	6-14-37	2¼	2⅝		
Pacific Coast Cement, com.[51]	6-22-37	3	..		
Pacific Coast Cement, 1st pfd.[51]	6-22-37	45	..		
Pacific P. C., com.[60]	6-14-37	3¾	4		
Pacific P. C., pfd.[60]	6-14-37	45	55		
Peerless Cement, com.	6-16-37	5⅝	6¼		
Penn.-Dixie Cement, com.	6-22-37	6	6¼	actual sale	
Penn.-Dixie Cement, pfd., A	6-22-37	40	52	actual sale	
Penn.-Dixie Cement, 6's A., 1941	6-17-37	.160	actual sale		
Penn. Glass Sand Corp., v.t.c. com.	6-22-37	40	52	.25	July 1
Penn Glass Sand Corp., pfd.	6-22-37	108¾	..	1.75	July 1
Penn. Glass Sand Corp., 1st mtg. 4½'s, 1960	Called June 1, 1937.				
Petoskey P. C., com.[50]	6-16-37	9¼	10¼		
Republic P. C., com.[51]	6-22-37	8½	10		
Republic P. C., pfd.	Called June 1, 1937, at $103 per share.				
Riverside Cement, A[9]	6-15-37	14	15		
Riverside Cement, B[9]	6-15-37	3	3¾		
Riverside Cement, pfd.[9]	6-15-37	95	98		
Rockland & Rockport Lime, com.[51]	6-22-37	2	..		
Santa Cruz P. C., pfd.[9]	6-15-37	41	44	.50	July 1
Schumacher Wallboard, com.[9]	6-15-37	5¾	6¼		
Schumacher Wallboard, pfd.[9]	6-15-37	21	22		
Signal Mt. P. C., com.[50]	6-16-37	2½	4		
Signal Mt. P. C., pfd.[50]	6-16-37	73	77		
Signal Mt. P. C., units[53]	6-22-37	78	..		
Southern States P. C., cap.[51]	6-22-37	38	..		
Southwestern P. C., units[60]	6-14-37	190	..		
Spokane P. C., units					
Standard Pav. & Mat., com.	6-17-37	5	5⅝		
Standard Pav. & Mat. pfd.	6-17-37	31	35		
Superior P. C., pfd.					
Superior P. C., A[60]	6-14-37	40	50		
Superior P. C., B[60]	6-14-37	16	18		
Trinity P. C., units[50]	6-16-37	70	..		
U. S. Gypsum, com.	6-22-37	107½	107⅞	actual sale .50	July 1
U. S. Gypsum, pfd.	6-22-37	162	165	1.75	July 1
Volunteer P. C., 1st 7's, 1942					
Volunteer P. C., units[46]	6-16-37	75	..		
Vulcanite P. C., com.[48]	6-16-37	9	11		
Vulcanite P. C., 7½'s, 1943					
Wabash P. C.[50]	6-16-37	11	..		
Warner Co., ww, 1st 6's, 1944[46]	6-16-37	89	..		
Warner Co., com.[50]	6-16-37	9½	11		
Warner Co., pfd.[50]	6-16-37	21	24		
Whitehall Cement Mfg., com.[53]	6-22-37	90	..		
Whitehall Cement Mfg., pfd.[53]	6-22-37	58	..		
Wisconsin L. & C., 1st 7's, 1940[50]	6-16-37	85	95		
Wolverine P. C., com.	6-17-37	4⅜	actual sale		
Yosemite, P. C., 4% pfd.[60]	6-14-37	4½	5	.10(qu.)	July 1

Quotations by [9]A. E. White Co., San Francisco, Calif. [10]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Seaver, Inc., Boston. [46]Martin Judge Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thomson & Co., Ltd., Toronto, Ont. [48]First National Bank of Chicago, Chicago, Ill. [49]Hewitt, Ladin & Co., New York, N. Y. [50]Rogers & Tracy, Inc., Chicago, Ill. [51]Paul D. Sheeline & Co., Boston, Mass.

Recent Dividends Announced

Arundel Corp. (quar.)	$0.25	July 1, 1937
(extra)	.25	July 1, 1937
Calaveras Cement, 7% pfd.	2.00	June 30, 1937
Ideal Cement Co.	1.50	May 27, 1937
Kelley Island Lime & Transp.	.40	June 30, 1937
Missouri Portland Cement	.50	June 30, 1937
Penn. Glass Sand Corp., pfd.	1.75	July 1, 1937
Santa Cruz Cement, cap.	.50	July 1, 1937
Yosemite Portland Cement Corp. (quar.)	.10	July 1, 1937

NEW ENGLAND LIME CO., Adams, Mass., reports sales and earnings for the year ended December 31, 1936, and for the part year April 17-December 31, 1935, as follows:

	Year to Dec. 31, '36	Apr. 17 to Dec. 31, '35
Net sales	$501,601	$298,279
Net income	16,708	15,592
Earned per share, pfd.	$1.45	$1.32
Earned per share, com.	(d)0.26	(d)0.18

Current assets as of December 31, 1936, were $172,673 and current liabilities, $66,695.

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WESTON & BROOKER CO., Columbia, S. C., crushed stone producer, reports for the years ended December 31:

	1936	1935
Net sales	$533,967	$309,372
Cost of sales	376,217	261,177
Expenses, etc. (net)	130,997	84,698
Net profit	26,753	(d)36,503

The balance sheet as of December 31, 1936, showed current assets $309,429 and current liabilities of $50,600; total assets were $650,924.

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ROCKLAND-ROCKPORT LIME CO., INC., Rockland, Me., reports for the years ended December 31:

	1936	*1935
Net sales	$435,767	$331,916
Cost of sales	353,319	268,294
Administration and selling expense	57,815	51,054
Operating profit	24,633	12,568
Margin of profit	5.65%	3.79%
Other income	2,745	3,050
Total income	27,378	15,618
Fixed charges	21,570	21,326
Net profit	5,808	(d)5,709

* January 1 to March 31, G. B. Wood, Receiver; April 1 to December 31, Rockland-Rockport Lime Co., Inc.

Current assets as of December 31, 1936, were $122,976 and current liabilities, $84,249.

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KENTUCKY ROCK ASPHALT CO., Louisville, Ky., reports for the year ended December 31, 1936:

Net sales of Kyrock	$489,547
Cost of sales	240,768
Profit on processed asphalt, etc.	46,487
Gross profit on sales	295,266
Selling and administrative expenses	120,121
Operating profit	175,145
Other income	16,069
Total income	191,214
Interest, etc.	100,526
Net income	90,688

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PENNSYLVANIA-DIXIE CEMENT CORP., New York City, stockholders have voted to change its Series A convertible 7% cumulative preferred stock from $100 par to no par value. Also, it was voted to reduce the amount of capital of the corporation represented by the preferred from $12,120,000 to $3,030,000, and to credit the reduction of $9,090,000 to surplus account. A further proposal was approved setting up from surplus a special reserve account for depreciation and depletion of $9,399,307 to which reserve is to be debited annually the amount by which the corporation's own charges for depreciation and depletion exceed the amount allowed as a deduction from the earnings of any year for federal income tax purposes.

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PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reports for the years ended December 31:

	1936	1935
Sales	$1,776,744	$1,273,425
Cost of sales	1,377,680	1,024,387
Selling, general and administration expense	204,202	166,138
Depletion	21,407	16,787
Depreciation	163,076	146,127
Operating profit	10,379	(d)80,010
Other income	1,984	(dr)2,783
Total income	12,363	(d)82,793
Loss, unconsolidated subsidiaries	4,889	19,496
Net profit	7,475	(d)102,292
Dividends	27,933	.....
Deficit	20,458	102,292
Earned per share	$0.01	(d)$0.18

Current assets as of December 31, 1936, were $584,168; current liabilities, $211,521.

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DIAMOND PORTLAND CEMENT CO., Middlebranch, Ohio, reports for the years ended December 31:

	1936	1935
Net sales	$693,445	$376,241
Cost of sales	353,620	210,502
Expenses, etc.	156,481	109,496
Depletion and depreciation	37,177	44,099
Operating profit	146,167	12,144
Margin of profit	21.08%	3.23%
Other income	6,249	3,387
Total income	152,416	15,531
Federal income tax	*19,067	2,236
Other deductions	.....	300
Net income	133,349	12,995

* No provision for Federal surtax required.

Note: For three months to March 31, 1937, net sales were $83,160 and net loss, after depreciation, etc., amounted to $18,295.

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PEERLESS CEMENT CORP., Detroit, Mich., reports for the year ended December 31, 1936:

Operating profit	$513,666
Depreciation	187,716
Port Huron idle plant expense	16,676
Dock and sundry expense	9,296
Net operating profit	299,978
Other income	20,742
Total income	320,720
Interest on bonds, notes, etc.	87,110
Federal income taxes	13,500
Net income	220,110
Earned surplus, December 31, 1935	Nil
Discount on bonds, etc.	26,137
Earned surplus, December 31, 1936	246,247
Times interest earned	3.68
Earned per share	$0.72

Notes: (1) As provided in the plan of reorganization no dividends can be paid on the common stock until funded indebtedness has been reduced to approximately $881,000 and a net working capital of $750,000 remains after payment of dividends.

(2) No provision for Federal surtax on undistributed profits.

Current assets as of December 31, 1936, were $972,447 and current liabilities, $289,227.

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MARBLEHEAD LIME CO., Chicago, Ill., reports for the years ended December 31, income account:

	1936	1935
Net sales	$1,165,137	$1,013,064
Cost of sales	950,140	781,659
Selling, administration and general expense	129,355	127,243
Operating profit	85,641	104,163
Margin of profit	7.35%	10.28%
Other deductions (net)	13,157	10,303
Bond interest, etc.	29,902	34,400
Federal income tax	6,944	15,385
*Net profit	35,637	44,075
Earned per share, preferred	$10.39	$12.85

*After deducting $65,074 (1935, $63,775) depreciation and depletion and before crediting discount on bonds acquired, $4,067 (1935, $29,109).

Current assets as of December 31, 1936, were $334,402 and current liabilities, $166,765.

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IDEAL CEMENT CO., Denver, Colo., reports for the years ending December 31, consolidated income:

	1936	1935
*Operating income	$3,037,112	$1,335,709
Other income	355,924	266,039
Total income	3,393,036	1,601,748
Bond interest	.....	69,111
Net income	3,393,036	1,532,637
Common dividends	3,322,465	1,031,110
Surplus for year	70,571	501,527

*After depreciation and depletion (1936, $730,141; 1935, $974,339) and federal taxes.

Earnings per share in 1936 were $7.40 compared with $3.34 in 1935.

Current assets as of December 31, 1936, were $8,836,511 and current liabilities were $1,073,274.

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SIGNAL MOUNTAIN PORTLAND CEMENT CO., Chattanooga, Tenn., reports for the years ending December 31, sales and earnings:

	1936	1935
Net sales	$932,127	$743,346
*Net income	189,738	112,624
Earned per share, com.	$0.23	(d)$2.34
Number of common shares, 29,984		

*After depreciation, obsolescence, federal income taxes, interest, etc.

Current assets as of December 31, 1936, were $762,132, and current liabilities $84,384.

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CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., reports for the years ended December 31, a consolidated income account:

	1936	1935
Net sales	$2,865,939	$1,581,059
Cost of sales	2,678,453	1,531,830
Depreciation, depletion and amortization	255,583	364,516
Operating loss	68,097	315,287
Other income (net)	9,934	4,637
Loss	58,163	310,650
Bond interest	181,400	181,387
Bond discount and expenditure	15,269	15,774
Gain, assets retired	4,213	(d)4,774
Net loss	*250,619	512,585

*Before $14,869 surplus credits.

Current assets as of December 31, 1936, were $653,885 and current liabilities, $999,055.

LIME PRODUCERS' FORUM

Conducted by Victor J. Azbe, Contributing Editor, St. Louis, Mo.

LIME KILN COOLERS*

WITH THE PREVIOUS DISCUSSIONS (in the June "Lime Forum") of the more theoretical angles in mind, we have a basis to build up some valuable practical information. The importance of proper cooler action was emphasized and to check, an experiment was tried to determine practically the value of the cooler. First a gas-fired kiln was operated over a long period, drawing fairly well cooled lime. Gas consumption under these conditions was 5200 cu. ft. of gas per ton of lime. Then for another period the kiln was operated so that no air could come up through the cooler at all. This was accomplished by maintaining a high enough pressure in the hot zone to fully counteract the stack draft effect of the hot cooler. Lime drawn was exceedingly hot and the gas consumption was 7000 cu. ft. per ton of lime, an increase of 34.5%, which checks the theoretical figure of 38.8% very well.

This kiln with the cooler functioning had a capacity of 51 tons of lime per day, which dropped off immediately to only 34 tons when hot lime was drawn, a reduction of 33%; and in addition to all this, the lime was of a poorer quality.

It now becomes quite apparent that design as well as operation of most of our kilns is quite wrong. By the study of the tabulation and the related heat flow diagram (ROCK PRODUCTS, June, 1937, p. 67), it will be discovered that in the preheating zone of the kiln 356 B.t.u. are exchanged between gas and stone; and that this can readily be accomplished because there is a surplus of heat available for this purpose, meaning that there is considerable temperature head for this transfer. In the cooler the heat interchanged is 245 B.t.u., but in this case for best results practically all must be extracted.

Further, the heat returned by the cooler is all predestined to make lime, which is not exactly the case with the heat brought down from the preheating zone. In view of this, one may say that while the cooler and its proper functioning is (if not more than) certainly equal in importance to the preheating zone. But if we look at kilns we find them sometimes with coolers just 5 ft. of total kiln height—so shallow that lime is taken out of the hot zone on every draw. Ineffective in height, but even then they are dobbed up, for reasons of poor design, so that as little air can enter them as possible. At the same time the preheating zone stretches itself up into the sky.

Cooler Dimensions

We can't possibly entirely cool the kiln gases regardless of kiln height. Even one theoretical kiln's stack gas has an average temperature of over 500 deg. F. The reason is that one cannot cool the gases by the amount of stone that is in the preheating zone, but rather by the amount of stone that passes through this zone. Most frequently there is more accomplished towards cooling the gases by making a deeper lime cooler than by making a higher preheating zone, for the simple reason that the hot zone then will contain more heat for dissociation of lime and will draw far more stone on the preheating zone.

Coolers for different conditions need to be of different design and of different heights. For a producer-gas kiln a cooler should be quite different from and larger than that for a natural-gas kiln. A cooler on a kiln that is drawn every hour, or possibly continuously, must also be different from one on a kiln that may be drawn every four hours. Again, to get certain effectiveness from the coolers, the hot zone must be designed properly so that the air coming up and the gas coming in will mix perfectly and not pass stratified up the kiln, causing a loss due to incomplete combustion and excess air, both simultaneously. It is this latter condition that often necessitates the dobbing of cooler doors, making ineffective what little space the cooler has.

A kiln using 5000 cu. ft. of gas per ton of lime, with a fully effective cooler, and drawing all air of combustion from the cooler, will receive this air at a temperature of about 1450 deg. F. This temperature will, however, fluctuate greatly, and while right after a draw is made it may be considerably in excess of 2000 deg. F., right before a draw it may be much below 1000 deg. F. Only on a continuous draw it would be about constant at 1450 deg. F. Air coming up through the coolers on a producer-gas fired kiln is much hotter because, while about the same amount of heat enters the cooler, in the lime, there is only about 60% of the air passing up, the other 40% having entered through the producers. With less air passing, temperature differences become less, and so larger coolers are necessary for thoroughly cooled lime.

Effect on Quality of Lime

One would think that coolers could not have much of an effect on quality of lime, but they do, and not only on quality but on appearance as well. In one particular case, with the cooler operating in such a way that conditions therein were oxidizing, the lime drawn was so badly discolored as to be almost the color of red brick; while when reducing conditions were maintained, the lime was, in most startling contrast, perfectly white. It was found that the lime had great avidity for oxygen and any hot gas containing oxygen passing slowly downwards, left the bottom of the cooler perfectly free of it. Of course the CaO was not responsible for this absorption. The cause was in the nature of the impurities which, by absorption of oxygen, changed composition and gave a red product.

Then, an improperly working lime cooler can also greatly harden the CaO portion of the lime by recarbonation. Although there is never any, or but little CO_2 in the cooler atmosphere, such conditions can be created that the core would be giving off CO_2, which would all be absorbed in the outer layers of the same lump, and if that happens core that could be removed would be preferable.

It is desirable to have finishing zones to dispose of the core at lower temperatures, such as developed by Irving Warner for rotary kilns, or by the writer for vertical kilns. But coolers themselves should be coolers in fact, wherein the lime is cooled as rapidly as possible to get it below the temperature at which recarbonation or oxidation is most likely to happen.

* Part of a paper delivered by Victor J. Azbe, at the 19th annual convention of the National Lime Association, Chicago, Ill., May 12, 1937.

SOME CORRECTIONS AND ELUCIDATIONS

During the discussion following the delivery of the writer's paper at the annual meeting of the National Lime Association, the question was asked as to what ratio of CO_2 to air is necessary to cause recarbonation. The hasty reply was that recarbonation was primarily a matter of temperature rather than CO_2 air ratio. This evidently is wrong and needs correction.

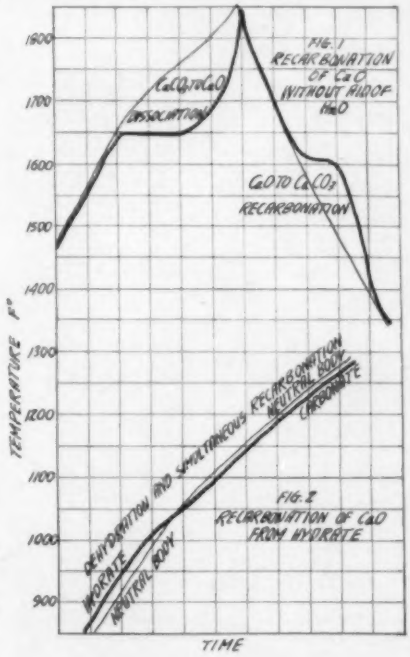
In analyzing the mechanics of recarbonation and the nature of lime a conclusion is arrived at which tends to indicate that while temperature is important, CO_2 concentration in the gases surrounding the lime is also important and probably more so. As it is, lime being porous with almost half of its volume occupied by gases, conditions are right for CO_2 to be absorbed from these gases, and by the law of diffusion, it is replaced from the stream external of the lump. Naturally, the higher the external CO_2 concentration the more will be the diffusion and so more CO_2 will enter to combine with the calcium oxide and form carbonate.

However, the temperature must be right, particularly as recarbonation is very slow at low temperatures, excepting through the aid of water vapor.

In criticism of some of the writer's statements in regard to recarbonation, one of those attending the meeting stated that there cannot be recarbonation without moisture. However, recarbonation in the high temperature just below the dissociation temperature, or between 1350 deg. F. and 1620 deg. recarbonation can take place, even if all traces of moisture are removed.

The test curves shown in Fig. 1 (herewith) indicate energetic recarbonation under a condition where the CO_2 gas was thoroughly dried by passing it through sulphuric acid and over phosphorus pentoxide. "At these higher temperatures water vapor would not be a factor even if present, because it cannot combine with lime in view of the fact that hydrate dissociates to calcium exide and water below 1200 deg. F."

Moisture is, however, an influential factor at lower temperatures and at around 1000 deg. F. hydrate very rapidly changes to carbonate in the presence of CO_2. This is shown by curve 3 of Fig. 2. Hydrate at about this temperature looses water and the oxide is extremely reactive. However, the lime passing from the hot zone cannot be hydrated and it cannot take any moisture from the air until it has cooled considerably; and, further, the amount of moisture in the air coming up through the cooler is rather small and capable of hydrating only a very small portion of the lime.



It may be that moisture acts somewhat as a catalyst, making lime receptive to CO_2, itself becoming liberated to immediately recombine, thus multiplying the harm. However, in the lower portion of the kiln cooler CO_2 is even scarcer than water vapor, and supposing the above action should take place, the extent would be limited by the amount of CO_2 in the combustion air in proportion to the lime drawn, which is almost undetectably small.

To be specific: Ordinary outdoor air will contain about 4 parts of CO_2 per 10,000. One ton of lime per day requires 32.5 cu. ft. of air per minute, or $32.5 \times 1440 = 46{,}800$ cu. ft. for the entire ton. This would make it 4.67 cu. ft. of CO_2, which weighs 0.54 lb., and would recarbonate about 1.2 lb. of CaO. Recarbonation by CO_2 in the air passing through the cooler can thus amount to considerably less than one tenth of one per cent, at the most, even with considerable excess air and complete absorption of CO_2—it actually figures to just 0.06%.

Kilns were operated experimentally by purposely maintaining the cooler hot, and making some of the hot gases pass downwards from the combustion zone, conditions apparently ideal for recarbonation; however, lime was impaired by only a few per cent nothing like what one would expect.

Therefore, it seems that recarbonation at higher temperatures can readily take place without the aid of water vapor, while at lower temperatures water vapor is a contributing influence. It also appears that recarbonation, when CO_2 is obtained from the outside of the lump, is impeded by the difficult gas penetration into the comparatively dense lump with pores scistunited by inert gases. If CO_2 concentration is high recarbonation in this manner will, of course, be greater particularly when temperature is just below dissociating level. Also, if lime is light, as when soft burned, action will be far more rapid than when it is dense.

With all of this, though, it seems that recarbonation by CO_2 given off from the core as discussed in May, 1937 issue of Lime Forum is the most likely cause of lime contamination.

Some Simple Items to Remember

The surest index of inefficiency of a lime kiln is the drawing of hot lime from the cooler.

Keeping such lime in the kiln hurts the lining. Make as much as you want, but get it away after it is made.

It's not the size of the kiln that counts, but rather the amount of stone surface; and the getting of heat to this surface. Within reason the smaller the stone the better.

Halving the stone size will cause it to burn to lime in about one-third the time.

Everything being right, four times the draft will make twice the lime.

A properly functioning cooler increases kiln capacity one-third with no increase in fuel.

A kiln is not the shell outside nor the brick lining, but rather the hole in the middle, and so this must be right if good results are to be obtained.

To expect a ton of lump lime per day from a square foot of shaft area of a good kiln is not at all unreasonable.

Using spalls, 3000 lb. of lime per day per square foot is entirely possible.

Will Build Stone Plant

Grand River Lime Works has resumed activities near Fairland, Okla., and is erecting a $5000 plant to furnish agricultural lime stone to farmers. The plant will have a daily capacity of 200 tons of stone.

Limestone for Pulp

Limestone is to be quarried from the Sam Graba claims at White Horse mountain, near Arlington, Wash., by large pulp manufacturing interests now that the Granite Falls deposit is being depleted. A bucket tramway is now under construction to transport the stone to the foot of the mountain.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of June 19:

Trunk

Sup. 2 to 35419 (cancels Sup. 1). **Refuse fuller's earth**, C. L., (See Note 2), to Saginaw, Mich. Eliminate from Sup. 1 to Rate Proposal No. 35419, proposal to increase rate from Marcus Hook, Penn., from $3.50 to $3.60 and substitute therefor proposal to reduce Philadelphia, Penn., rate from $3.60 to $3.50. Reason—$3.60 rate from Philadelphia, Penn., was based on erroneous mileage.

35887. **Crushed stone and screenings**, in straight or mixed carloads, (See Note 2), from Birdsboro, Monocacy and Trap Rock, Penn., to Youngstown, O., 18½c per 100 lb. Reason: To reestablish rate formerly in effect.

35889. **Gravel, sand, slag, stone**, crushed, coated with oil, tar, asphaltum* in open top cars, C. L., (See Note 2), from Dunbar, Penn., to Williamson, W. Va., $2.40 per net ton.

35920. To cancel commodity rate of $4.50 per net ton on **slag**, crushed, C. L., from Newport, Penn., to Chicago, Ill.

35930. **Roasted dolomite** (refractory dolomite in granular form, treated or untreated, clinkered or burned to a dead state), C. L., minimum weight 60,000 lb., (2) roasted calcite, in granular form (treated or coated, clinkered and burned to a dead state), C. L., (See Note 2), from Millville and Martinsburg, W. Va., to Latrobe, Penn., $1.69 per net ton. (1) From Millville, W. Va., only. (2) From Millville and Martinsburg, W. Va.

35932. To amend Item 5980, Agent Curlett's Tariff I. C. C. No. A-496, providing for Class 20 rating on **marble, crushed**, and **marble screenings**, in bags or in bulk, straight or mixed carloads, minimum weight 60,000 lb. from Harrisonburg, Va., to Trunk Line and New England territories, by providing for the application thereof to C. F. A. territory, including extended Zone "C" in Wisconsin and the W. T. L. "Northwest" territory.

35948. **Crushed stone**, coated with oil, tar or asphaltum, C. L.* from Snow Flake, W. Va., to Pikeville, Ky., $1.90 per net ton, in lieu of present rate $5.20.

35952. **Stone dust, stone chips**, C. L., (See Note 2), from DeKalb Junction, N. Y., to points in New York, New Jersey and Pennsylvania, rates ranging from $1.85 to $5.35 per net ton.

35971. **Sand**, ground or pulverized, in closed cars, C. L., (See Note 3), provided that orders will not be accepted for closed cars of less marked capacity than 80,000 lb., from Mayport, Penn., to Hamilton, Ontario, $3.69 per net ton.

Central

50931. To establish on **slag**, uncoated, not ground or pulverized, in bulk, in open top equipment, C. L., from North Tonawanda, N. Y., to various points in C. F. A. territory, rates on basis of Docket 15329 (West Penn Scale).

50937. To establish on **slag**, C. L., from Ironton, O., to C. & O. Ry. stations in West Virginia and Kentucky (Gauley, W. Va., and west), rates ranging from 80c to Savage Branch, Ky., to 140c to Manco, Ky.

50955. To amend Item 7540-A, Sup. 11, C. F. A. L. Exceptions Tariff 130-Y, naming scale rates on **stone, crushed, slag or gravel**, coated with oil, tar or asphaltum in open top equipment, C. L., from various points in Ohio to stations in Ohio applicable on intrastate shipments only, by providing for the addition of "Hillsboro, O.," as a point of origin.

51000. To cancel rates on **stone, rip rap and rubble**, C. L., published in P. R. R. Tariff I. C. C. 1732, and P. & L. E. R. R. Tariff I. C. C. 3208, from Ellwood Junction and Kopel, Penn., to Albion, Battle Creek, Cadillac, Kalamazoo, South Haven, Sturgis, and Ypsilanti, Mich., and from Ellwood Junction, Ellwood City and West Ellwood Jct., Penn., to Albion, Battle Creek, Cadillac, Kalamazoo, South Haven, Sturgis and Ypsilanti, Mich., respectively. Classification basis to apply.

51006. To establish on **industrial sand**, C. L., (See Note 3), from Huron, O., to Brantford, Galt, Guelph, Hamilton, 334c; London, 309c; St. Catharines, St. Marys, 334c; St. Thomas, 309c, and Toronto, Ont., 374c per net ton.

(Rates in cents per net ton)
From Muskegon, Mich., to (representative)

	Routes	Prop. Rates
Adrian, Mich.	8	211
Alma, Mich.	9, 10, 11	153
Battle Creek, Mich.	3, 5	153
Bay City, Mich.	2, 4, 12	188
Big Rapids, Mich.	1	142
Coldwater, Mich.	8	176
Detroit, Mich.	2, 4, 5, 10	199
Flint, Mich.	2, 3	176
Grand Ledge, Mich.	10	142
Grand Rapids, Mich.	1	107
Holland, Mich.	10	130
Ionia, Mich.	2	130
Jones, Mich.	6	176
Kalamazoo, Mich.	1	142
Lansing, Mich.	3, 10	153
Monroe, Mich.	4, 8, 10	211
New Buffalo, Mich.	5, 10	188
Niles, Mich.	5	176
Port Huron, Mich.	2	211
St. Joseph, Mich.	10	176
Saginaw, Mich.	2, 11	188
Sturgis, Mich.	1	153
Three Oaks, Mich.	5	188
Three Rivers, Mich.	6, 7	153
Wayne, Mich.	4, 5, 10	199
White Cloud, Mich.	10	142
White Pigeon, Mich.	8	176
Vineland, Mich.	5	188

Routes:
1—P. R. R. direct.
2—P. R. R.—Grand Rapids, Mich.—G. T.
3—P. R. R.—Vicksburg, Mich.—G. T.
4—P. R. R.—Grand Rapids, Mich.—M. C.
5—P. R. R.—Kalamazoo, Mich.—M. C.
6—P. R. R.—Wasepi, Mich.—M. C.
7—P. R. R.—Grand Rapids, Mich.—N. Y. C.
8—P. R. R.—Sturgis, Mich.—N. Y. C.
9—P. R. R.—Big Rapids, Mich.—P. M.
10—P. R. R.—Grand Rapids, Mich.—P. M.
11—P. R. R.—Howard City, Mich.—P. M.
12—P. R. R.—Reed City, Mich.—P. M.

51007. To establish on **crushed stone**, also **sand and gravel**, C. L., to Ft. Wayne, Ind., from *Wolcottville, †Huntington, *Peru, 50c, and †Keeport, Ind., 57c per net ton.
*Sand and gravel.
†Crushed stone.

51026. To establish on **sand** (except industrial) **and gravel**, C. L., from Peru, Ind., to Rochester, Ind., 50c net ton.

51028. To establish on **sand** (except industrial) **and gravel**, C. L., from Cayuga, Ind., to McCowen, 94c; Newman, Murdock, Camargo, Tuscola, Ficklin, Garrett, Atwood, Pierson, Hammond, Burrowsville, Linter, LaPlace, Casmer, Long Creek, Decatur, Body, Blackland, Osbernville, Mt. Auburn, Bolivia, Roby, Buchkart, Derry Farm, Keys, East Springfield and Springfield, Ill., 101c per net ton.

51029. To establish on **stone, crushed, slag or gravel**, coated with oil, tar or asphaltum* in open top equipment, C. L., from Miamiville, O., to Decatur, 176c; Fort Wayne, 188c; Kendallville, La Otto, 199c, and Portland, Ind., 153c per net ton.

51030. To establish on **stone, crushed, slag or gravel**, coated with oil, tar or asphaltum* in open top equipment, carload, (See Note 3), from Muskegon, Mich., to points in Michigan, rates as shown.

51036. To establish on **sand** (except industrial) **and gravel**, C. L., (See Note 3), from LaFayette, Ind., to Bluffton and Ossian, Ind., 88c per net ton.

51037. To establish rate of 50c per net ton on (a) **sand** (except industrial) or **gravel**, in open top cars, C. L., from Wolcottville and Winona Lake, Ind., to Fort Wayne, Ind., and (b) **crushed stone and stone screenings**, in bulk, in open top cars, C. L., (See Note 3), from Middlepoint, Ohio, to Fort Wayne and Monroeville, Ind.

51038. To establish on **roasted dolomite** (refractory dolomite), (in granular form, treated or untreated, clinkered or burned to a dead state), C. L., (See Note 3), from Bettsville, Maple Grove, Gibsonburg and Woodville, Ohio, to Muncie, Ind., 190c per net ton.

51041. To establish on **sand** (except industrial), **and gravel**, in open top equipment, C. L., from Beach City, Ohio, to Ashland, 90c; Alliance, 80c; Barberton, 60c; Elyria, 95c; Kent, 85c; Lorain, 95c, and Ravenna, Ohio, 85c per net ton.

51042. To establish on **sand** (except industrial), in open top cars, C. L., from Hugo, Ohio, to Painesville, Ohio, 75c per net ton.

51043. To correct rates on **sand** (except industrial), in open top cars, C. L., min. wt. as per B. & L. E. R. R. Tariff I. C. C. 1029, from Henlein, Penn., to Buffalo, 140c; Depew, Harriet, Lancaster, Lockport, Niagara Falls, North Tonawanda and Suspension Bridge, N. Y., 150c per net ton. (Will be held as maximum to intermediate points, except where application of the same formula produces higher rates.)

51078. To establish on **stone**, crushed; **slag and gravel**, coated with oil, tar or asphaltum,* in open top cars, in straight or mixed carloads, from Neville Island, Penn., and Woodville Junction, Penn., to points west of the Cumberland-Cresson line located on the B. & O., B. & L. E., Montour, P. R. R., P. & L. E., P. C. & Y. and P. & W. Va. railroads, rates on basis of I. C. C. Docket 22598 (Shaw Junction), single or joint line scale, as follows, in cents per net ton:

	Single	Joint
20 miles and under	73	88
40 miles and over 20 miles	83	98
60 miles and over 40 miles	93	108
80 miles and over 60 miles	103	118
100 miles and over 80 miles	113	128

51080. To establish on **quartzite and silica rock**, C. L., (See Note 3), from Niagara Falls, N. Y., to Philo, Ohio, 250c per gross ton.

51087. To amend Item 4730 of C. F. A. L. Tariff 130-Y, applicable on **limestone, agricultural**, min. wt. 50,000 lb., intrastate within Ohio by adding thereto as an origin point Marion, Ohio, on the C. C. C. & St. L. Ry.

51088. To establish on **stone, crushed, slag or gravel**, coated with oil, tar or asphaltum* in open top equipment, C. L., from Youngstown, Ohio, to Big Run, Penn., 133c per net ton.

51089. To establish on **limestone** (industrial) in open top cars, C. L., (See Note 2), from Templeton, Penn., to Monessen, Penn., 94c per gross ton. Route—Via P. R. R., Homestead, Penn.—P. & L. E. R. R.

*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

51109. To cancel commodity rates on **brick and articles taking brick rates; brick, sand-lime and brick, common**, from Jackson, Mich., to points in Indiana, Michigan and Ohio, published in M. C. R. R. Tariff I. C. C. 5877; N. Y. C. R. R. Tariff I. C. C. LS-1270; C. C. C. & St. L. Ry. Tariff I. C. C. 8601 and G. T. Ry. Tariff I. C. C. A-2421, classification basis to apply.

51114. To establish on **filter gravel**, C. L., in box cars (See Note 3), but orders will not be accepted for cars of less than 80,000 lb., from Jackson, Ohio, to New York City, N. Y., 376c per net ton.

51116. To establish on **stone**, crushed, in bulk, in open-top cars, C. L., (See Note 3), from Spore, Ohio, to Two Miles, W. Va., to Blue Creek, W. Va., 190c; Walgrove to Dorfeel, W. Va., 200c; Elkhurst to Ira, W. Va., 210c; Villa Nova to Gassaway, W. Va., 220c per net ton. Route: Via N. Y. C. R. R., Charleston, W. Va., B. & O. R. R

51139. To establish on **fluxing stone**, C. L., from Lawrence, Ohio, to Portsmouth, Ohio, 70c per gross ton. Route—Via D. T. & I. R. R., Bloom Jct., Ohio, B. & O. R. R.

51141. To establish on **crushed stone, crushed stone screenings**, C. L., from Karns City, Penn., to points in Pennsylvania on the B. & O. R. R., viz., Butler, Petrolia, Bruin, St. Petersburg, Alum Rock, 60c; Turkey, Kahle Siding, Ritts, Knox, Shippenville, Clarion Junction, 70c; Lucinda, Snydersburg, Tylersburg, Crown, Vowinkel, 80c; Marienville, Byromtown, 90c; Chaffee, Nansen, Madge, Jo Jo Junction, Kane, 100c; Mt. Jewett, 110c; Echo, Yatesboro, Dayton (Armstrong County, 80c; Valier, Punxsutawney, 90c; Trade City, Savan, Oak Tree, Marion Center, 100c; Parkwood, McIntyre, Aultman, West Lebanon, 110c, and Clarksburg, 120c per net ton. Route—Via B. & O. R. R.

51146. To cancel Item 9810 of N. Y. C. Tariff 525-Q, publishing rate of 27c on **ore mica**, dry, ground, min. wt. 40,000 lb. and similar items of other individual lines, from Chicago, Ill., to Economy, Penn., classification basis to apply.

51150. To establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from White Bear, Mo., to Akron, 335c; Ashtabula, Ohio, 355c; Battle Creek, Mich., Cincinnati, 275c; Cleveland, 335c; Columbus, 305c; Dayton, Ohio, 275c; Detroit, Mich., 315c; Elkhart, 255c; Evansville, 225c; Ft. Wayne, 265c; Indianapolis, Ind., 235c; Kalamazoo, Mich., 265c; LaFayette, 215c; Logansport, Michigan City, 235c; Muncie, Napanee, Ind., 245c; Napoleon, Ohio, 285c; Port Huron, Richmond, St. Clair, Mich., 335c; Sandusky, Ohio, 315c; South Bend, 245c; Terre Haute, Ind., 205c; Toledo, Williamsport, 295c and Youngstown, Ohio, 365c per net ton.

51232. To establish on **sand and gravel**, C. L., actual weight will govern, from Attica, Ind., to Taylorville, Ill., 80c per net ton. Route: Via Wabash Ry.

51153. To establish on (a) **sand**, naturally bonded molding, in all kinds of equipment, C. L.; sand (except naturally bonded molding; ground or pulverized sand), in closed equipment, C. L.; (b) sand, ground or pulverized in all kinds of equipment, C. L.; and (c) sand (except naturally bonded molding; ground or pulverized sand), in open top equipment, C. L., from stations in the Muskegon, Mich., group, viz., Grand Haven, Muskegon and Rosy Mound, Mich., to points in Illinois, Indiana, Iowa, Michigan, Missouri, New York, Ohio, Pennsylvania and West Virginia.

51169. To establish on (a) **lime**, C. L., min. wt. 30,000 lb., and (b) lime, C. L., min. wt. 50,000 lb., from Mitchell, Ind., to Black Fork, Ohio; (a) 16c and (b) 13c, via B. & O. R. R. direct.

51170. To establish on **blocks, cinder cement**, C. L., min. wt. 60,000 lb. Rule 24 of Official Classification will not apply, from Erie, Penn., to Hubbard, Ohio, 165c per net ton. Route—Via P. R. R., Transfer, Penn., and Erie R. R.

51172. To establish on **limestone**, unburnt, ground or pulverized, C. L., min. wt. 60,000 lbs., from McVittys, Ohio, to destinations in Michigan, rates on basis of I. C. C. Docket 25220 scale.

Southern

14701. **Lime**, C. L. Establish rates from Pine Hill, Ky., to C. & O. stations in Ky., in line with rates from and to other points.

14706. **Sand, crude silica**, C. L. Establish rates from Pacific, Mo., to specified points in Ala. and Tenn., same as in effect from Ottawa, Ill.

14743. **Limestone, agricultural ground**, C. L. Establish 110c net ton from Dugan, Ky., to Mt. Vernon and Carbon, Ind.

14780. **Mica schist, dry-ground or screened**, C. L., minimum 60,000 lb. Establish from Clarksville and Tiger, Ga., to Baltimore, Md., 33c; Bound Brook, Manville and Rutherford, N. J., 36c; Chicago, Chicago Heights and Joliet, Ill., 39c; Erie, Penn., 40c; Philadelphia and York, Penn., 34c per cwt.

14803. **Sand and gravel**, C. L. Establish 300c net ton from Memphis, Tenn., to Chicago, Ill.

14814. **Fuller's earth**, C. L. Establish rates from Superior, Fla., to Eastern port cities, Buffalo, N. Y., Pittsburgh, Penn., Chicago, Ill., Cleveland, Ohio, St. Louis, Mo., Cincinnati Ohio, and Louisville, Ky., on same basis as suggested under Submittal 14553, from Attapulgus, Ga., Midway, Jamieson and Quincy, Fla.

14819. **Sand**, C. L. Establish 216c net ton from stations taking Group 1 in N. S. I. C. C. A-735 to Patterson, Jewel Valley, Oakwood and Page, Va.

14832. **Crushed stone**, C. L. Establish 30c net ton from Dugan, Ky., to Ekron, Ky., (intrastate). Truck competitive. Expires 60 days from date effective.

14833. **Crushed stone**, C. L. Establish 60c net ton from Dombey, Ky., to Springfield, Ky. (intrastate). Truck competitive. Expires 60 days from date effective.

14836. **Fuller's earth**, C. L. Establish Ochlocknee, Ga., to Dover, Ohio, 770c, min. wt. 70,000 lb., and 864c net ton, min. wt. 50,000 lb.

14844. Cancel, as obsolete, rates on **asphaltic sandstone**, C. L., from Garfield, Ky., to Ky. points named in L. & N. G. F. O. 1008-A. Class or combination rates to apply.

14860. Establish 220c on **natural asphaltic sandstone**, C. L., 250c on **processed asphaltic sandstone**, C .L., and 310c net ton on **bituminous rock and coated stone, from Big Clifty**, Black Rock, Bowling Green, Leitchfield, Rockport and Summit, Ky., to Charleston, W. Va.

14868. **Limestone**, C. L., min. 60,000 lb. Establish to Panama City, Fla., for transshipment to Pacific Coast from Cartersville, Ga., 211c; Whitestone and Tate, Ga., 221c net ton.

14892. **Calcium (lime), phosphate of**, C. L., min. 30,000 lb. Establish 55c cwt. from Charleston, S. C., to St. Louis, Mo., East St. Louis and Belleville, Ill.

35975. To establish at Sidney, N. Y., handling charge of $5 per car on **rough quarried stone**, C. L., shipped to Sidney, N. Y., from quarries located within the limits of Sidney, N. Y., and reshipped from Sidney, N. Y., to various destinations. Reason—This charge now applicable at South Unodilla, N. Y.

35976. To cancel rate of $3.28 per net ton on **sand refuse**, C. L., from Hockessin, Del., to New Village, N. J., published in B. & O. R. R. I. C. C. 22916, Item 4210. Reason—No present or prospective movement.

35981. To cancel commodity rates applying on **fire silica, clay**, from Scranton and Wyoming, Penn., to destinations in C. F. A. territory, on basis of Group 248, Agent Curlett's Tariff I. C. C. A-520. Reason—No present or prospective movement.

M-3642. To establish on **carbonate of lime**, N. O. I. B. N., in Official Classification, C. L., min. wt. 40,000 lb., Class 25 to apply between points in Official Classification territory, including extended Zone C in Wisconsin and W. T. L. "Northwest" territory, and from Western Trunk Line other than "Northwest" to Official territory.

35985. **Crushed stone and screenings**, in straight or mixed carloads (will not include agricultural limestone or ground limestone unburnt; fluxing stone or firestone, or stone coated with oil, tar or asphaltum), (See Note 2), from Monacacy, Penn., to Front Royal, Va., $1.90 per net ton, in lieu of present sixth class rate 21c per 100 lb.

35992. **Limestone**, C. L., from Beachville, Ont., to Cumberland, Md., 26c per 100 lb., in lieu of present sixth class rate 37c.

E-41-220. **Industrial sand**, viz., sand, naturally bonded, molding, C. L., usual min. wt., from Elwood, Ill., to destinations in Michigan and Wisconsin. Rates: Present—Class or combination. Proposed—To representative points:

To			
Marquette, Mich.	270	Green Bay, Wis.	200
Menominee, Mich.	220	Manitowoc, Wis.	190
Appleton, Wis.	190	Wausau, Wis.	230
Fond du lac, Wis.	180		

D-25-50. Proposed—To cancel, account obsolete, plaster and related articles; also plasterboard, from Centerville, Iowa, to points in S. W. F. B. territory provided on pages 12 to 161, incl., of S. W. L. Tariff No. 31-K.

D-41-204 (Appl. Bn. 4503. **Limestone**, crushed or ground, C. L. From Omaha, Neb., Louisville, Neb., and Weeping Water, Neb., to Colorado common points. Failed of adoption.

D-41-207 (Appl. Bn. 4508). **Limestone**, crushed or ground, C. L., from Omaha, Neb., to Kansas City, Mo.-Kan. Failed of adoption.

D-43-34 (Appl. Bn. 4510, 4528). **Stone**, broken, crushed or ground, C. L., from E. St. Louis, Krause and Stolle, Ill., to Oshkosh, Eau Claire, Wis., Menominee, Mich. Approved docketed proposal in principle.

Western

C-111-1. To provide mixed carload rule on cement, asbestos or **mineral wool** when shipped in mixed carloads with waterproofing compounds, etc., between W. T. L. territory, also from Official Classification territory to W. T. L. territory.

C-151-9. **Feldspar**, crude or ground, C. L., from Custer, Hill City, Keystone, Nahant and Pringle, S. D., to Mississippi River crossings. Proposed—$4.60 per ton, minimum 80,000 lb.

D-91-55—**Soapstone** (not to exceed 4,000 lb. per car) in mixed carloads with asphalt, from Chicago, Ill., to Topeka, Kan. Proposed rate of 25 cents per 100 lb.

E-41-217. **Limestone**, crushed or ground, C. L. Usual minimum weight to govern, from Omaha, Neb., and Alden, Ia., to stations in Minnesota, North Dakota and South Dakota. Proposed—To establish specific commodity rates on basis of the scale shown below, such rates to be predicated on short lines' mileages computed via short workable routes not to exceed three lines. (Rates in cents per 100 lb.)

Miles	Rate	Miles	Rate	Miles	Rate
80	7½	225	10	450	14
90	7½	250	10	500	15
100	7½	275	11	550	16
115	8	300	11	600	17
130	8	325	12	650	18
145	8	350	12	700	19
160	8	375	13	750	20
175	9	400	13	800	21
200	9				

The above basis to apply for both single and joint line hauls and when approved, rate check to be held to check specific rates for publication.

Sup. 1 to E-41-217. **Limestone**, crushed or ground, C. L., usual minimum weight, from Omaha, Neb., and Alden, Iowa, to Cloquet, Minn. Rates as shown in App. No. E-41-217. Application Bulletin No. 4547, dated May 25, 1937.

Sup. 2 to E-41-217. **Limestone**, crushed or ground, C. L., usual minimum weight, from Valmeyer, Ill., to stations in Minnesota, North Dakota and South Dakota. Rates: As shown in App. No. E-41-217. Application Bulletin No. 4547, dated May 25, 1937.

E-41-218. **Silica** (white sand), including ground silica, straight or mixed carloads, (See Note 3), but not less than 40,000 lb., from Hermann, Mo., to points in Illinois, Indiana, Ohio, Pennsylvania and West Virginia. Proposed—To representative points. (Rates in cents per ton of 2000 lb.

To: Canton, Ohio, 216; Cincinnati, Ohio, 290; Indianapolis, Ind., 239; Pittsburgh, Penn., 428.

E-41-219. **Stone,** crushed, ground or pulverized, C. L., (See Note 2), but not less than 40,000 lb., from Weeping Water, Neb. to points in Colorado. Proposed: 450c per ton of 2000 lb.

E-54-16. (a) **Stone,** silica, natural (tripoli), pulverized), in bulk, in bags, C. L., minimum weight 60,000 lb. (b) Tripoli (ground), in barrels or sacks, C. L., (See Note 3), from Baxter Springs, Kan., to Group 22 (Peoria) and Group 3 (Chicago), as defined in Item 100 of W. T. L. Tariff No. 18-N. Proposed —(a) On articles as shown in paragraph (a) above: Peoria group, 20c per 100 lb. Chicago group, 24c per 100 lb., except will not apply to points in Wisconsin. (b) On articles in paragraph (b) above: Chicago group points in Wisconsin, 30c per 100 lb.

E-76-33. **Poultry grit,** C. L., from Quincy and Valmeyer, Ill., to stations on the G. B. & W. Lines. Proposed—Add Waupaca, Iola and Stevens Point, Wis., in W. T. L. Tariff 369, at 25c rate from Quincy and 27c rate from Valmeyer. Add also Sturgeon Bay, Wis., on the A. & W. Ry. and Kewaunee, Wis., on K. G. B. & W. R. R. at 28c rate from Quincy and 30c rate from Valmeyer.

E-151-10—**Feldspar,** C. L., minimum weight 50,000 and 80,000 lb., from Salida, Colo., to Shreveport, La. Proposed—25c higher than from Canon City, Colo.

Southwestern

11345. To establish rate of 795c on 50,000 lb. minimum and 675c per ton of 2000 lb. on 80,000 lb. minimum on **feldspar,** carloads, from Salida, Colo., to Shreveport, La.

11359. To establish rate of 90c per ton of 2000 lb. on **crushed granite,** (See Note 2), from Middlebrook, Mo., to Brentwood, Edgebrook and Lake Junction, Mo.

11372. To establish a commodity rate of $5.25 per ton of 2000 lb., (See Note 2), on **stone,** broken or crushed (ranging in size up to 200 lb. weight), from Lyons, Colo., to Houston, Tex.

11384. To establish rate $1.19 per ton of 2000 pounds on **crushed stone,** carloads, from Moline, Kan., to Pryor, Okla.

11448. To establish rate of $7 per ton of 2000 lb. on **granules,** roofing, consisting of crushed slate or crushed stone, carloads (See Note 2), from Poultney, Vt., Granville, N. Y., Slate Hill, Penn., Glad Hill, Penn., Delta, Penn., and Whiteford, Md., to Shreveport, La.

11453. **Silica stone, natural (tripoli),** Baxter Springs, Kan., to St. Louis group. To establish rate of 16½c per 100 lb.

11518. To establish rates on **plaster and related articles** as described in S. W. L. Tariff 219, C. L., min. wt. 40,000 lb., from Southard, Okla., to points in Kentucky, Virginia and West Virginia, on same basis as concurrently published in S. W. L. Tariff 219 from Southard, Okla., to the Southeast and cancel rates from and to same points where published in W. T. L. Tariff 324, I. C. C. A-2546.

Illinois

6180-A. **Silica sand,** washed or processed, C. L., (See Note 3), not powdered or pulverized to such fineness that 90% or more will pass through a No. 100 mesh screen, from Ottawa, Ill., district to Knoxville, Tenn. Proposed—$4.05 net ton.

6947-1-B. **Crushed stone,** C. L., min. wt. same as now published in Wabash Ry. Tariff H16505, Ill. C. C. 988, from Hannibal, Mo., to Carthage and Hamilton, Ill. Proposed, 88c net ton.

8427. **Moulding sand,** C. L., (See Note 3), but not less than 40,000 lb., from Gladstone, Ill. Proposed—To St. Louis, Mo., $1.26 net ton; to Hannibal, Mo., 90c net ton to La Grange, Mo., 90c net ton.

8427-1. **Moulding sand,** C. L., (See Note 3), but not less than 40,000 lb., will apply, from Gladstone, Ill. Rates per net ton:

To	Present	Proposed
Belvidere, Ill.	$2.02	$1.50
DeKalb, Ill.	2.02	1.50
Elgin, Ill.	2.02	1.50
Freeport, Ill.	$2.02 and 1.51	1.40
North Chicago, Ill.	2.02 & 1.51	1.60
St. Charles, Ill.	2.02	1.50
Sycamore, Ill.	2.02	1.50
Waukegan, Ill.	$2.02 & 1.51	1.60

Rates Reduced

APPEAL of the Burlington Railroad for authority to cut sand and gravel rates from Gravelvale, Grand Island and Columbus, Nebr., to other points named has brought reductions of five to ten cents a ton by permission of the railway commission. The request was made in order to meet motor truck competition.

Gravel Rate Hearing

MISSISSIPPI RAILROAD COMMISSION will hold a hearing July 20 at Jackson, Miss., on proposed adjustments to eliminate alleged differences between interstate and intrastate sand and gravel rates. Protests relative to the rates has been filed by the Southern Railway and the Louisville and Nashville Railroad.

Projected Slate Plant

A GROUP of business men has leased 160 acres of land at No-Name lake near Newport, Wash., and are making arrangements to quarry slate from the large deposit in this location.

What Price Aggregates?

A SOUTHERN READER sends in an item showing that the concrete products industry is even invading the great Smokey mountain section. Crushed stone for aggregate is hauled some 15 miles across country by ox-cart from the crushing plant to the products plant. It seems that freight rates hold no fears for this operator.

Hauling crushed stone by ox-cart

Publications Received

STATE GEOLOGICAL SURVEY, Kansas, has published a geological map of Kansas showing 92 outcropping geologic units over the state by means of colors, patterns and lines together with drainage, towns and township lines. This 40-x51-in. map is available with and without state and federal highways for $1 per copy.

Dry Ice Industry Gains

PRODUCTION of dry ice increased 179.6% in quantity and 64.8% in value from 59,057,600 lb., valued at $1,960,526, in 1933, to 165,123,912 lb., valued at $3,245,692, in 1935, according to preliminary figures compiled from returns of the recent biennial census of manufacturers.

Rock Wool for Kansas?

KANSAS state has been found to have much rock suitable for the manufacture of rock wool and there is a movement to establish plants in several sections of the state. The best grade of rock is said to lie about 20 miles east of Wichita.

An Unusual Order

A CONCRETE SILO was chosen as the testing medium on a farm near South Bend, Ind., recently to determine the strength of the all-steel body on a 1937 Studebaker Dictator sedan. The services of a silo concern were retained and a 10,000 lb. precast silo was built on the top of a standard car and filled with 3000 lb. of silage. Incidentally, the car did not fail.

Welding Electrode

THE LINCOLN ELECTRIC CO., Cleveland, Ohio, has developed a new arc welding electrode, "Fleetweld 9," especially for flat welding of deep-groove joints and where high quality butt welds are desired at minimum cost. This electrode is designed to operate with either alternating or direct current and may be had in 3/16-, 1/4-, and 5/16-in. sizes.

CONTACT WITH MOVING MACHINERY

Claims Another Needless Victim

ONE OF THE MOST REGRETTABLE recent fatal accidents in the cement industry occurred a few weeks ago when an oiler permitted his clothing to come into contact with moving machinery. The victim's trousers were caught by a revolving shaft with projecting key, and he was dashed to his death. There was no opportunity to turn off the power or to otherwise attempt a rescue. He could have pointed a loaded revolver at his temple and pulled the trigger without any greater assurance of fatal result. The accident was regrettable because this type is so needless and has been so often warned against. Allowing clothing to touch moving parts has come to be known in the industry as careless practice No. 999,999.

It was an accident of almost this identical kind that many years ago almost cost the life of the industry's well-known safety leader, J. B. John. He was then an oiler. Leaning over a revolving shaft, his overalls caught on some small protrusion. Fortunately, the garment was torn off or Mr. John might have been fatally injured. He has often recalled this experience as his most impressive safety lesson. But the victim of the current accident was not so fortunate.

Twice to the Same Fire

An even more startling fact in connection with the current accident, disclosed in the investigation that ensued, was that the victim, who had been employed by the same company for 12 years, had suffered the same sort of a mishap *PREVIOUSLY*. On that occasion he was also caught on a shaft and his clothing torn from his body! Twice to the same fire—a startling proof of the fact that many men forget even such harrowing experiences, and can hardly be too frequently reminded to avoid dangerous practices.

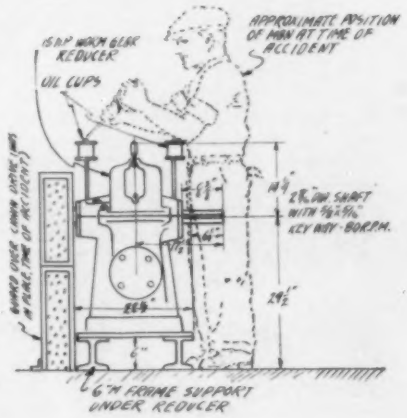
A condensed account of the accident illustrated in the accompanying sketch merely reads: "Deceased's trousers were caught on a shaft extension from a Griffin speed reducer. As the sketch shows, *the accident could have been avoided.*" So by glancing at the sketch we see the figure of a man leaning over the speed reducer oiling a cup on the far side. The reducer was running. An extension of the shaft—2 7/16 in. by 6¼ in., with keyway, pressed against and engaged the oiler's clothing. On the other side of the reducer, the side which carried the oil cup, all of the moving parts were closely guarded and a knowledge of the general arrangements indicates that the cup could have been oiled more conveniently from the near side, which was the guarded side.

Why Did It Happen?

Such a terrible accident as this, costing a human life and leaving without support a wife, and a family of four children all under 16 years of age, forcefully presents the question, Why and how could it happen? Here are some of the factors brought out by a careful inquiry:

(1) The reducer was running. It should not have been running. It was not the practice in this plant to oil *any* machine while in motion. It could easily have been stopped. There was a *rule in effect* against oiling machinery in motion. Had the victim made a *practice* of violating this rule?

(2) What could have induced the victim to attempt to perform this operation the hard way, by going behind the apparatus, on the only unguarded side, while he had free access to the easy, guarded side. He had been employed at this plant for 14 years and was supposed, because of his experience, to be a capable man in his work but—*was his mind on what he was doing*?



(3) The unguarded shaft extension was 29½ in. from the floor. Why was it not guarded? Should it not have been considered hazardous, notwithstanding rules against touching moving parts?

(4) Was the victim of this accident frequently reminded of the deadly danger of violating these rules? If he was, why did he persist in the violation? Was he incapable of understanding (and therefore unsuited to his job), did he not care to follow advice, or was the advice or reminder delayed or forgotten until too late?

Take Nothing for Granted

Around moving machinery, in whatever industry, nothing can be taken for granted. Responsibility for this accident can be pinned very confidently on human failure: Failure of the victim to either obey rules or use common sense; failure of supervision to impress the victim frequently of his deadly peril or to discover his possible incompetency; failure of those who watch exposed locations to place a guard on the shaft. The fact that the victim had been in a similar mishap previously calls attention to the advisability of securing more complete knowledge of an employe's past history.

This accident has cost tremendously in sorrow, loss of earning power, interruption to plant operations, and in other ways. It can be profitable in only one way: By serving to prevent or make less likely repetitions. If you have moving machinery in your plant see that it is guarded; insist that no one touch any part that is in motion and last, but not least, see that every workman is given frequent forceful reminders.

Phosphate Patent Suit

UNITED STATES DISTRICT COURT recently upheld a patent of the Phosphate Recovery Corp. in a suit brought against the Southern Phosphate Corp., Baltimore, Md., charging infringement of a Chapman-Littleford patent issued in 1934. A counter suit against the Phosphate Recovery Corp., charging infringement of one of the Southern Phosphate Corp.'s patents for treatment of minerals, was dismissed.

E-41-218. **Silica** (white sand), including ground silica, straight or mixed carloads, (See Note 3), but not less than 40,000 lb., from Hermann, Mo., to points in Illinois, Indiana, Ohio, Pennsylvania and West Virginia. Proposed—To representative points. (Rates in cents per ton of 2000 lb.

To: Canton, Ohio, 216; Cincinnati, Ohio, 290; Indianapolis, Ind., 239; Pittsburgh, Penn., 428.

E-41-219. **Stone**, crushed, ground or pulverized, C. L., (See Note 2), but not less than 40,000 lb., from Weeping Water, Neb. to points in Colorado. Proposed: 450c per ton of 2000 lb.

E-54-16. (a) **Stone**, silica, natural (tripoli), pulverized), in bulk, in bags, C. L., minimum weight 60,000 lb. (b) Tripoli (ground), in barrels or sacks, C. L., (See Note 3), from Baxter Springs, Kan., to Group 22 (Peoria) and Group 3 (Chicago), as defined in Item 100 of W. T. L. Tariff No. 18-N. Proposed —(a) On articles as shown in paragraph (a) above: Peoria group, 20c per 100 lb. Chicago group, 24c per 100 lb., except will not apply to points in Wisconsin. (b) On articles in paragraph (b) above: Chicago group points in Wisconsin, 30c per 100 lb.

E-76-33. **Poultry grit**, C. L., from Quincy and Valmeyer, Ill., to stations on the G. B. & W. Lines. Proposed—Add Waupaca, Iola and Stevens Point, Wis., in W. T. L. Tariff 369, at 25c rate from Quincy and 27c rate from Valmeyer. Add also Sturgeon Bay, Wis., on the A. & W. Ry. and Kewaunee, Wis., on K. G. B. & W. R. R. at 28c rate from Quincy and 30c rate from Valmeyer.

E-151-10—**Feldspar**, C. L., minimum weight 50,000 and 80,000 lb., from Salida, Colo., to Shreveport, La. Proposed—25c higher than from Canon City, Colo.

Southwestern

11345. To establish rate of 795c on 50,000 lb. minimum and 675c per ton of 2000 lb. on 80,000 lb. minimum on **feldspar**, carloads, from Salida, Colo., to Shreveport, La.

11359. To establish rate of 90c per ton of 2000 lb. on **crushed granite**, (See Note 2), from Middlebrook, Mo., to Brentwood, Edgebrook and Lake Junction, Mo.

11372. To establish a commodity rate of $5.25 per ton of 2000 lb., (See Note 2), on **stone**, broken or crushed (ranging in size up to 200 lb. weight), from Lyons, Colo., to Houston, Tex.

11384. To establish rate $1.19 per ton of 2000 pounds on **crushed stone**, carloads, from Moline, Kan., to Pryor, Okla.

11448. To establish rate of $7 per ton of 2000 lb. on **granules**, roofing, consisting of crushed slate or crushed stone, carloads (See Note 2), from Poultney, Vt., Granville, N. Y., Slate Hill, Penn., Glad Hill, Penn., Delta, Penn., and Whiteford, Md., to Shreveport, La.

11453. **Silica stone, natural (tripoli)**, Baxter Springs, Kan., to St. Louis group. To establish rate of 16½c per 100 lb.

11518. To establish rates on **plaster and related articles** as described in S. W. L. Tariff 219, C. L., min. wt. 40,000 lb., from Southard, Okla., to points in Kentucky, Virginia and West Virginia, on same basis as concurrently published in S. W. L. Tariff 219 from Southard, Okla., to the Southeast and cancel rates from and to same points where published in W. T. L. Tariff 324, I. C. C. A-2546.

Illinois

6180-A. **Silica sand**, washed or processed, C. L., (See Note 3), not powdered or pulverized to such fineness that 90% or more will pass through a No. 100 mesh screen, from Ottawa, Ill., district to Knoxville, Tenn. Proposed—$4.05 net ton.

6947-1-B. **Crushed stone**, C. L., min. wt. same as now published in Wabash Ry. Tariff H16505, Ill. C. C. 988, from Hannibal, Mo., to Carthage and Hamilton, Ill. Proposed, 88c net ton.

8427. **Moulding sand**, C. L., (See Note 3), but not less than 40,000 lb., from Gladstone, Ill. Proposed—To St. Louis, Mo., $1.26 net ton; to Hannibal, Mo., 90c net ton to La Grange, Mo., 90c net ton.

8427-1. **Moulding sand**, C. L., (See Note 3), but not less than 40,000 lb., will apply, from Gladstone, Ill. Rates per net ton:

To	Present	Proposed
Belvidere, Ill.	$2.02	$1.50
DeKalb, Ill.	2.02	1.50
Elgin, Ill.	2.02	1.50
Freeport, Ill.	$2.02 and 1.51	1.40
North Chicago, Ill.	2.02 & 1.51	1.60
St. Charles, Ill.	2.02	1.50
Sycamore, Ill.	2.02	1.50
Waukegan, Ill.	$2.02 & 1.51	1.60

Rates Reduced

APPEAL of the Burlington Railroad for authority to cut sand and gravel rates from Gravelvale, Grand Island and Columbus, Nebr., to other points named has brought reductions of five to ten cents a ton by permission of the railway commission. The request was made in order to meet motor truck competition.

Gravel Rate Hearing

MISSISSIPPI RAILROAD COMMISSION will hold a hearing July 20 at Jackson, Miss., on proposed adjustments to eliminate alleged differences between interstate and intrastate sand and gravel rates. Protests relative to the rates has been filed by the Southern Railway and the Louisville and Nashville Railroad.

Projected Slate Plant

A GROUP of business men has leased 160 acres of land at No-Name lake near Newport, Wash., and are making arrangements to quarry slate from the large deposit in this location.

What Price Aggregates?

A SOUTHERN READER sends in an item showing that the concrete products industry is even invading the great Smokey mountain section. Crushed stone for aggregate is hauled some 15 miles across country by ox-cart from the crushing plant to the products plant. It seems that freight rates hold no fears for this operator.

Hauling crushed stone by ox-cart

Publications Received

STATE GEOLOGICAL SURVEY, Kansas, has published a geological map of Kansas showing 92 outcropping geologic units over the state by means of colors, patterns and lines together with drainage, towns and township lines. This 40-x51-in. map is available with and without state and federal highways for $1 per copy.

Dry Ice Industry Gains

PRODUCTION of dry ice increased 179.6% in quantity and 64.8% in value from 59,057,600 lb., valued at $1,960,526, in 1933, to 165,123,912 lb., valued at $3,245,692, in 1935, according to preliminary figures compiled from returns of the recent biennial census of manufacturers.

Rock Wool for Kansas?

KANSAS state has been found to have much rock suitable for the manufacture of rock wool and there is a movement to establish plants in several sections of the state. The best grade of rock is said to lie about 20 miles east of Wichita.

An Unusual Order

A CONCRETE SILO was chosen as the testing medium on a farm near South Bend, Ind., recently to determine the strength of the all-steel body on a 1937 Studebaker Dictator sedan. The services of a silo concern were retained and a 10,000 lb. precast silo was built on the top of a standard car and filled with 3000 lb. of silage. Incidentally, the car did not fail.

Welding Electrode

THE LINCOLN ELECTRIC CO., Cleveland, Ohio, has developed a new arc welding electrode, "Fleetweld 9," especially for flat welding of deep-groove joints and where high quality butt welds are desired at minimum cost. This electrode is designed to operate with either alternating or direct current and may be had in 3/16-, ¼-, and 5/16-in. sizes.

CONTACT WITH MOVING MACHINERY

Claims Another Needless Victim

ONE OF THE MOST REGRETTABLE recent fatal accidents in the cement industry occurred a few weeks ago when an oiler permitted his clothing to come into contact with moving machinery. The victim's trousers were caught by a revolving shaft with projecting key, and he was dashed to his death. There was no opportunity to turn off the power or to otherwise attempt a rescue. He could have pointed a loaded revolver at his temple and pulled the trigger without any greater assurance of fatal result. The accident was regrettable because this type is so needless and has been so often warned against. Allowing clothing to touch moving parts has come to be known in the industry as careless practice No. 999,999.

It was an accident of almost this identical kind that many years ago almost cost the life of the industry's well-known safety leader, J. B. John. He was then an oiler. Leaning over a revolving shaft, his overalls caught on some small protrusion. Fortunately, the garment was torn off or Mr. John might have been fatally injured. He has often recalled this experience as his most impressive safety lesson. But the victim of the current accident was not so fortunate.

Twice to the Same Fire

An even more startling fact in connection with the current accident, disclosed in the investigation that ensued, was that the victim, who had been employed by the same company for 12 years, had suffered the same sort of a mishap *PREVIOUSLY*. On that occasion he was also caught on a shaft and his clothing torn from his body! Twice to the same fire—a startling proof of the fact that many men forget even such harrowing experiences, and can hardly be too frequently reminded to avoid dangerous practices.

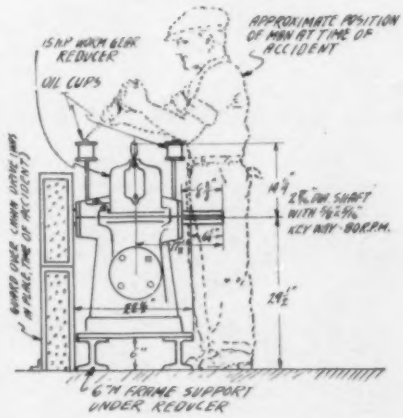
A condensed account of the accident illustrated in the accompanying sketch merely reads: "Deceased's trousers were caught on a shaft extension from a Griffin speed reducer. As the sketch shows, *the accident could have been avoided.*" So by glancing at the sketch we see the figure of a man leaning over the speed reducer oiling a cup on the far side. The reducer was running. An extension of the shaft—2 7/16 in. by 6¼ in., with keyway, pressed against and engaged the oiler's clothing. On the other side of the reducer, the side which carried the oil cup, all of the moving parts were closely guarded and a knowledge of the general arrangements indicates that the cup could have been oiled more conveniently from the near side, which was the guarded side.

Why Did It Happen?

Such a terrible accident as this, costing a human life and leaving without support a wife, and a family of four children all under 16 years of age, forcefully presents the question, Why and how could it happen? Here are some of the factors brought out by a careful inquiry:

(1) The reducer was running. It should not have been running. It was not the practice in this plant to oil *any* machine while in motion. It could easily have been stopped. There was a *rule in effect* against oiling machinery in motion. Had the victim made a *practice* of violating this rule?

(2) What could have induced the victim to attempt to perform this operation the hard way, by going behind the apparatus, on the only unguarded side, while he had free access to the easy, guarded side. He had been employed at this plant for 14 years and was supposed, because of his experience, to be a capable man in his work but—*was his mind on what he was doing*?



(3) The unguarded shaft extension was 29½ in. from the floor. Why was it not guarded? Should it not have been considered hazardous, notwithstanding rules against touching moving parts?

(4) Was the victim of this accident frequently reminded of the deadly danger of violating these rules? If he was, why did he persist in the violation? Was he incapable of understanding (and therefore unsuited to his job), did he not care to follow advice, or was the advice or reminder delayed or forgotten until too late?

Take Nothing for Granted

Around moving machinery, in whatever industry, nothing can be taken for granted. Responsibility for this accident can be pinned very confidently on human failure: Failure of the victim to either obey rules or use common sense; failure of supervision to impress the victim frequently of his deadly peril or to discover his possible incompetency; failure of those who watch exposed locations to place a guard on the shaft. The fact that the victim had been in a similar mishap previously calls attention to the advisability of securing more complete knowledge of an employe's past history.

This accident has cost tremendously in sorrow, loss of earning power, interruption to plant operations, and in other ways. It can be profitable in only one way: By serving to prevent or make less likely repetitions. If you have moving machinery in your plant see that it is guarded; insist that no one touch any part that is in motion and last, but not least, see that every workman is given frequent forceful reminders.

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New MACHINERY & EQUIPMENT

Convertible Shovel

HARNISCHFEGER CORP., Milwaukee, Wis., announces the new P&H Model 855 2-yd. high-speed excavator, welded of alloy steels, in the line of P&H "pacemakers". Greater strength and rigidity with less weight are claimed for this ecavator, which is fully convertible as shovel, dragline, crane or clamshell. Standard "line" shovel and dragline booms are 25 ft. long and 60 ft. long, respectively.

High-speed excavator

The excavator is powered by an 8-cyl. Fairbanks-Morse Diesel engine, but may be furnished with gasoline or electric power if required. Removal "cats", which may be extended in length, are provided to reduce ground pressure.

Air Filter

AIR-MAZE CORP., Cleveland, Ohio, has recently perfected a new oil bath type air filter, for which a patent is pending, into which a backfire valve may be incorporated upon request. This filter is designed to eliminate the practice of placing "relief" valves on the intake pipe elbows or ends of many large engines in order to avoid damage to filters from engine backfires. The hood of the new filter is fitted with a complete backfire valve assembly mounted on a web casting which is screwed to the filter center stem. The valve rests on leakproof gaskets and is spring loaded. This filter is available in sizes especially intended for engines requiring 450 to 4000 cu. ft. of air per minute and is adaptable to interior or exterior mountings.

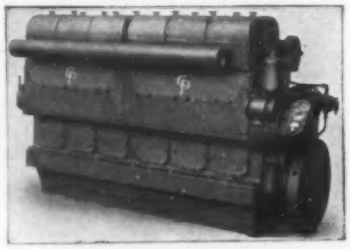
Exterior of filter valve in raised position

Electric Cable Insulation

GENERAL ELECTRIC CO., Schenectady, N. Y., has recently introduced commercially "Flamenol," a synthetic insulating compound, which is similar to rubber in characteristics but does not contain rubber and will not support combustion. This compound is said to be highly resistant to moisture, acids, alkalies and oils and to have excellent aging and strength characteristics. Flamenol can be made a very soft and flexible compound or made to be one with celluloid-like rigidity. It may be put into solution for coating or impregnating and can be compounded, filled, calendered and extruded in much the same fashion as rubber. The insulator is recommended for use on cables for power and control circuits at 600 volts and less.

Improved Diesel Engines

CHICAGO PNEUMATIC TOOL CO., New York, N. Y., announces a new type 8 CP Diesel engine which is now available in four models. The new engines are said to incorporate latest developments in construction, design and combustion control. They are of the four-cyle, direct injection type and are especially designed for medium speed and continuous duty. All wearing parts are completely enclosed from dust, all lubrication is accomplished automatically and instant starting is claimed through use of a simple starting valve which admits air to a cam-shaft-driven rotary distributor. Models 38 CP, 48 CP, 68 CP and 88 CP have 3, 4, 6 and 8 cylinders respectively.



Type 8 Diesel engine

Jaw Crusher

PIONEER GRAVEL EQUIPMENT MANUFACTURING CO., Minneapolis, Minn., announces as its latest contribution to the crushing industry the Pioneer 2433 jaw crusher, weighing one-half as much as old style crushers of the same size. The old Blake type 24x36-in. crusher weighed between 30 and 40 tons while the new crusher weighs just 16 tons. Weight savings have been accomplished by the use of an electric cast steel frame and Pitman in place of cast iron; by the substitution of an overhead eccentric in place of the swinging jaw, separate Pitman and bottom eccentric; and the use of a safety toggle plate which protects the crusher frame against breakage. Force feed action, double crushing stroke, simpler construction, easier adjustment and greater capacity are advantages claimed for the overhead eccentric. The crusher, which is equipped with SKF bearings, is readily changed to any desired opening by an adjusting lever and has 12 sq. ft. of crushing area.

Primary jaw crusher

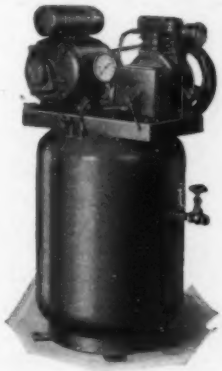
Percussion Drill

INGERSOLL-RAND CO., Phillipsburg, N. J., has introduced a new 55-lb. Jackhamer, a hard hitting, fast-drilling tool which is designed especially for use in hard rock and where deeper holes are desired. Air consumption is said to be very low because of an improved valve

Light tool designed especially for fast drilling and for use in hard rock

design, a feature which makes this Jackhamer ideal for use with portable air compressors or where the air supply is limited. The JA-55 is designed for operation with a ¾-in. air hose.

A new line of Ingersoll-Rand fractional horsepower air compressors is also announced, in ¼- and ½-hp. sizes, which are equipped with automatic stop



New ¼ horsepower single-stage air compressor

and start control, a new style seamless steel tank and an improved check valve. These compressors are rated for 150 p.s.i. maximum pressure but may be set for lower pressures, or may be equipped with a reducing valve for still lower pressures. The ¼- and ½-hp. units are available on a 2.4-cu. ft. tank and the ½-hp. unit may be had on a 4.6-cu. ft. tank in either vertical or horizontal mounting. If desired the compressors can be furnished without the tank.

Plug-In Electrical Instruments

WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Penn., announces new, low-cost detachable electrical instruments for general industrial use whose sockets may be cut into the conduit run feeding a motor or grouped in standard metal boxes to

Detachable ammeter in weatherproof socket

constitute a panel assembly. Advantages claimed for the plug-in instruments are that the socket provides its own switchboard, eliminating costly panels, wiring and mounting details; that various instruments can be plugged in the same socket to obtain volts, amperes, watts, power factor, etc.; and that sockets can be installed and sealed off, providing convenient outlets for future installation of instruments. It is claimed that the detachable instrument offers certain advantages in industry where it is desired to install one or a few instruments for various forms of circuits. For such installations a metal trough is available and equipped with socket receptacles

Illustrating snug fit of instrument into socket

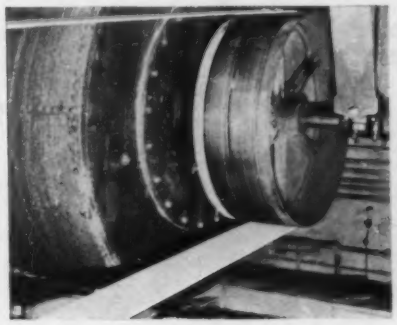
for detachable instruments. All wiring is then made to and from the trough by conduit. Detachable instruments are available in A. C. ammeters self-contained up to 75 amperes, while a current transformer is used with a 5-ampere detachable instrument for heavier currents. Single and polyphase wattmeters are available self-contained up to and including 20 amperes and 115 volts.

Group of single unit sockets and plugging in trough

Direct current ammeters up to and including 30 amperes which may be provided with shunts for larger currents. Voltmeters are provided for a range of 150 to 750 volts for direct current and from 150 to 600 volts for alternating current.

Belt Performance

RAYBESTOS-MANHATTAN, INC., Passaic, N. J., Manhattan Rubber Manufacturing Division, reports an unusual performance for two Condor compensated belts.

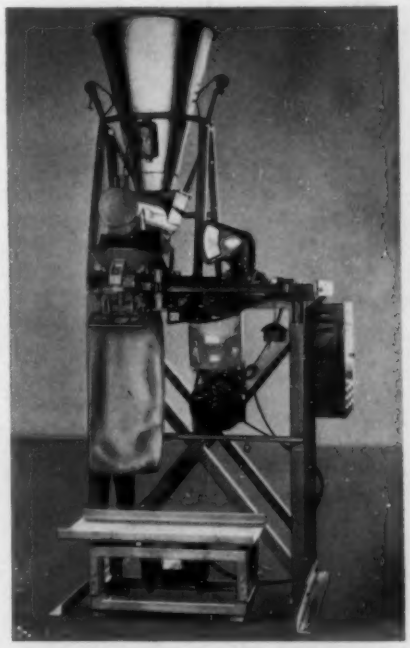


Belt unaffected by two floods

Two horizontal water-wheel drives at the Prospect Mills, Inc., plant, Lawrence, Mass., equipped with Condor compensated belts, were submerged by flood waters. In one flood the belts were submerged under seven feet of water for five days and in the second flood, water up to 20 ft. in depth covered the belts. After each flood the belts were dried, cleaned, dressed and put back into operation without any ill effects.

Bag Weighing Machine

SYNTRON CO., Homer City, Penn., has just placed on the market a new bag weighing machine for use in weighing out bulk materials as fed from a storage bin or conveyor to the supply hopper on the machine. The new machine is designed around the company's "Vibra-Flow" feeders, which flow the material from the hopper to the bag opening. The bag or sack is held in a quick-acting,



Bag weighing machine for bulk materials

hand-operated chuck mounted on a scale beam and a noiseless vibrator on the supply hopper keeps the contents agitated and prevents arching over and clogging. The initial flow of material through the feeder is at high speed until the bag or sack is nearly up to weight, when the flow is cut by electrical control to a slow dribble and an exact cut-off. Outstanding advantages claimed are extreme accuracy coupled with reasonable operating speed. Along with the use of this machine a vibrating packer is available onto which the filled bag drops when the holding chuck is released and which packs the bag's contents down to the smallest volume before the bag is slid to the sewing machine.

C. A. Swiggett, superintendent

LEHIGH PORTLAND CEMENT MAKES

Tangible Awards

TO EMPLOYES FOR SAFETY RECORD

OF TEN YEARS WITHOUT ACCIDENT

APPROXIMATELY $14,000 in cash and company stock was awarded employes of the Iola, Kan., plant of the Lehigh Portland Cement Co., May 25, by Joseph S. Young, president of the company, as "tangible evidence" of the company's appreciation of their all-time industrial record of 10 consecutive years' operation without a lost-time accident.

The awards ranged from a minimum of $10 cash to a maximum of approximately $200 in Lehigh stock, now quoted on the stock market at approximately $40 a share. All awards were based on length of service regardless of position or salary. Mr. Young made it clear that while he hoped as many of the employes as possible would keep the stock, they could feel entirely free to exercise their own discretion in converting it into cash if they so preferred.

Mr. Young declared that he was here to "give tribute to you men of the Iola plant for accomplishing the impossible!" He recalled that it was not so long ago when for a plant to go through one year without a lost-time accident was "approaching the miraculous." That was in 1924 when the first safety award was made at Mitchell, Ind. "The following year," he said, "Iola started on its long and courageous ten-year march toward a goal that not even the most optimistic believed could possibly be attained."

That complete reversal of performance, he declared, didn't just happen.

SAFETY FOLLOWS WISDOM
PORTLAND CEMENT ASSOCIATION
SAFETY TROPHY AWARDED
LEHIGH PORTLAND CEMENT COMPANY
IOLA KANSAS PLANT FOR A
PERFECT SAFETY RECORD IN 1927
REAWARDED FOR A PERFECT
SAFETY RECORD IN 1928
1929 — 1930 — 1931 — 1932
1933 — 1934 — 1935 — 1936

Officials who attended the re-dedication are (left to right) R. R. Bear, vice-president and chief engineer; C. A. Swiggett, superintendent, Joseph S. Young, president, and Col. Henry A. Reninger, special representative

"You can't make a highly dangerous plant a place of comparative safety over night. Moreover, it is physically impossible to convert careless and negligent workmen into safe and alert employes in a twinkling of the eye."

What happened, declared Mr. Young, was a change in the attitude of the men which transformed them from "a bunch of indifferent and disinterested workmen into an organization of cautious and alert employes," who not only had a proper regard for their own personal safety but exercised "team play" to the point of watching out for the other man's safety as well.

"Apart from the saving of life and limb, in my opinion the most important advantage to be gained from safety work is the development of this higher degree of coördination. No safety record is possible without coöperation and no coöperation is possible without a close personal and harmonious relationship between all employes from the president down. No victory was ever won without team play."

Mr. Young then announced a new company policy of giving all employes who had been with the company one year or more, mill workers included, one week's vacation, with pay.

Aside from the unexpected announcements by Mr. Young, the afternoon program was chiefly featured by the presentation of two safety awards. One was the re-award of the cast stone safety trophy of the Portland Cement Association that has graced the Lehigh grounds here since 1927, and the other was a special certificate of award from the Joseph A. Holmes Safety Association.

In making the Joseph A. Holmes award, Dan Harrington, U. S. Bureau of Mines, said: "In all the history of modern industry, I haven't the slightest hesitation in saying that the record of the Iola cement plant stands alone. To have produced 5,959,682 bbl. of cement in mills that present almost every hazzard to employes that there is over a period of ten years without a single lost time accident is a record that has not been duplicated in the world."

Bankrupt

TRACTOR CITY SAND AND GRAVEL CO., Janesville, Wis., filed a voluntary petition in bankruptcy, May 12, in the federal court at Madison, Wis. Liabilities are listed at $56,995 and assets at $18,000.

Alumina Silicates

ALUMINA SILICATES CORP., Memphis, Tenn., has purchased the site and buildings of the former Memphis Milling Co. and will install equipment and machinery for preparation and distribution for insulation, a neutralizing powder for dry cleaning establishments, etc. The mineral used is mined at Ripley, Miss. Vernon L. Buchman is president.

Construction Material Costs

INCREASED CONSTRUCTION VOLUME is not enough to justify the Administration's demands that the increasing business of durable goods industries must be slowed up because of rising costs, at least as far as the construction industry is concerned, the governing boards of the Associated General Contractors of America were told recently.

E. J. Harding, managing director of the association, said that material costs in construction in April, 1937, were lower than the average for such costs in the year 1934, and that the industry is still operating at only half the volume it had in the pre-depression era.

Steel costs have been particularly condemned, he said, and it is commonly supposed that construction uses a great proportion of the steel produced. Statistics show, however, that only 6% of the total steel tonnage in 1936 was used in construction. "A boycott on construction, therefore, would make little impression on the steel industry," he said.

Pyrophyllite

FELDSPATHIC RESEARCH CORP., which is closely affiliated with the Tennessee Mineral Products Corp., Spruce Pine, N. C., will start construction shortly at Staley, near Greensboro, N. C., of a plant to grind pyrophyllite, which is a mineral that has been used to an increasing extent in recent years in making various kinds of pottery. For some time the pyrophyllite deposit owned by the corporation at Staley has been mined and the output shipped to the plant of the Tennessee Mineral Products Corp., Spruce Pine, for grinding. When the new Staley plant is completed, all grinding of pyrophyllite will be done there.

Field Office

ASPHALT INSTITUTE, New York City, has established at 613 Southwestern Life Building, Dallas, Tex., a new field office, to handle engineering, research and promotional activities in Texas, Arkansas and Oklahoma. D. D. Williamson, formerly head of the Texas State Highway Laboratories, is in charge of the Dallas office. Other offices of The Asphalt Institute are located in New York, Washington, Cincinnati, Kansas City, San Francisco, Seattle and Los Angeles. The asphalt industry is particularly interested in the development of the Southwestern market and within the last few months the following companies have been elected to membership in the Institute: Anderson-Prichard Oil Corp., and Col-Tex Refining Co., of Oklahoma City; the Cosco Oil Co., and Cosden Oil Corp., of Fort Worth, and the Magnolia Petroleum Co., of Dallas.

The Asphalt Institute has recently published "Asphalt Pocket Reference for Highway Engineers," which contains much helpful information in convenient form.

Recent Publications

CARBON DIOXIDE: A 294-p. book by Elton L. Quinn, professor of chemistry, University of Utah, and Charles L. Jones, former chief engineer, American Dry Ice Corp.; published by Rheinhold Publishing Corp., New York City; price $7.50.

To technical men in the lime and cement industries, which produce and waste millions of tons a year of carbon dioxide (CO_2), incidental to their manufacturing processes, this book should prove of much interest and practical value. All the physical and chemical properties of CO_2 are given and probably all its known uses. Many of these uses, other than for solid CO_2, or dry ice, are unknown to the layman, but are of probably equal or greater significance in industry. Such a use is the manufacture of urea from CO_2 and ammonia (NH_3). Urea is a concentrated fertilizer and of growing importance in the industrial field as a reagent in the manufacture of organic plastics.

Manufacturing processes are described, although the production of CO_2 from the waste gases of kilns is not described in detail. The main part of any recovery process is, of course, the purifying and compression of the gas, whether it be from a lime kiln or a coke burner. An interesting process in use by the Crystal Carbonic Laboratory, Atlanta, Ga., is described, in which Cartersville dolomite, pulverized to minus 60-mesh, is treated with sulphuric acid. Practically pure CO_2 gas is recovered, and the magnesium sulphate is separated from the calcium sulphate and sold as Epsom salts. The calcium sulphate residue is gypsum and also has some commercial value.

Naturally, considerable space is devoted to dry ice and its production. To one who has not followed recent developments the variety of present uses of commercial CO_2 is really astonishing. We dare say, the time is not far distant when the immense amount of CO_2 now wasted in lime and cement manufacture will be recovered and sold at a profit, not alone for dry ice, perhaps, but for many of these other industrial uses.

NATIONAL ASSOCIATION *Activities*

Crushed Stone Directors At White Sulphur

RETURNING PROSPERITY was evidenced by the number of directors of the National Crushed Stone Association who attended the semi-annual meeting at White Sulphur Springs, W. Va., June 17. The meeting was brief and snappy, covering the routine business of the association, the interim reports of its officers and the selection of a time and place for the 1938 annual convention. The principal other topic of discussion was the labor situation.

The time and place of the next convention was fixed as the week of January 24, 1938, at Cincinnati, Ohio. This selection was made largely to meet the desires of the associate members—machinery manufacturers—to hold one exhibit for the conventions of both the National Crushed Stone Association and the National Sand and Gravel Association. The convention of the latter will be the week following at the same hotel, which saves the exhibitors much time and trouble.

J. R. Boyd, administrative director, and A. T. Goldbeck, engineering director, were complimented for the completeness and clearness of their reports on association activities. The financial condition of the association is constantly improving and the whole atmosphere of the meeting was one of optimism, in spite of the present serious labor situation.

The following directors were present: H. E. Rodes, president, Nashville, Tenn.; W. M. Andrews, New Castle, Penn.; W. P. Beinhorn, Minneapolis, Minn.; L. J. Boxley, Roanoke, Va.; J. R. Boyd, administrative director, Washington, D. C.; F. O. Earnshaw, Youngstown, Ohio; A. T. Goldbeck, engineering director, Washington, D. C.; Otho M. Graves, Easton, Penn; N. E. Kelb, Indianapolis, Ind.; E. J. Krause, St. Louis, Mo.; M. S. Lambert, Manufacturers' Division, Chicago, Ill.; Thos. McCroskey, Knoxville, Tenn.; W. T. Ragland, Raleigh, N. C.; H. E. Rainer, Buffalo, N. Y.; Russell Rarey, Columbus, Ohio; J. A. Rigg, Fort Spring, W. Va.; Daniel Sanborn, Kankakee, Ill.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; L. W. Shugg, Manufacturers' Division, Schenectady, N. Y.; W. S. Sparks, Princeton, Ky.; Stirling Tomkins, New York City; T. I. Weston, Columbia, S. C.; A. L. Worthen, New Haven, Conn. There were also guests.

Sand and Gravel Directors At Buffalo, N. Y.

DIRECTORS of the National Sand and Gravel Association spent two days in Buffalo, N. Y., June 24 and 25, at their semi-annual meeting. A good share of the time was devoted to discussion of current labor problems and to ways and means of continuing the research work of the association. Agreeable to the wishes of the exhibitors in the manufacturers' division, the week of January 31, 1938, at Cincinnati, Ohio, were selected as the time and place of the next annual convention. This is the week following the National Crushed Stone Association convention, which permits the exhibit to remain in place for both meetings.

As customary V. P. Ahearn, executive secretary, reviewed in considerable detail, not only the activities of the association but the legislative situation in Washington as it bears on the business of the industry. The most important pending legislation is perhaps the Black-Connery bill which would give to a Fair Labor Standards Board power to fix minimum wages and length of work day in every industry. Mr. Ahearn expressed the opinion that this bill would not be enacted into law at this session of Congress unless something occurred to change the present political setup. However, something like it is certain in the near future.

In conclusion, Mr. Ahearn said in part: "An examination of the report of the U. S. Bureau of Mines on the sand and gravel industry during 1936 shows that during that year the cost of the Association to the industry which it has represented for twenty-one years was exactly four one-hundredths of one per cent of the value of the output. This is an insignificant fraction of the total wealth of the sand and gravel industry. The record of service which the Association has established is one which should have a much larger recognition from the industry than is now the case. No more important question can be considered by this Board than that of instituting ways and means of enlisting a larger measure of support from the sand and gravel industry, particularly in view of the undeniable fact that even larger responsibilities will be imposed upon the Association in the future than it has assumed in the past."

Stanton Walker, director of engineering, made an eloquent plea for more funds for association research, which, according to action of the board, he will get, through appointment of a special committee to study and develop ways and means. Mr. Walker listed the following as possible problems for research:

(1) Adhesion of bitumens to aggregates of different mineral composition and surface texture.

(2) Stability and durability of bituminous mixtures as affected by shape of aggregate particle.

(3) Methods for measuring durability of aggregates and relationship of that factor to quality of finished product.

(4) Volume changes of concrete due to temperature and moisture as affected by characteristics of aggregate and proportions of the concrete.

(5) Fatigue of concrete subjected to repeated impact and static loads as affected by characteristics of aggregate.

(6) Stability and drainage of railroad ballast as affected by characteristics of aggregate.

(7) Methods for design of concrete mixtures with particular reference to aggregates.

(8) Methods for measuring the size and grading of aggregates.

(9) Identification of aggregate particles considered harmful to the finished product and methods for evaluating their effects.

(10) National survey of aggregate characteristics to provide basis for specifications in different localities.

The following directors were present: Alexander Foster, Jr., president, Philadelphia, Penn.; J. Rutledge Hill, vice-president, Dallas, Tex.; W. A. Bliss, Pittsburgh, Penn.; Otto S. Conrades, St. Louis, Mo., Wm. Edward Hole (representing F. D. Coppock) Greenville, Ohio; C. S. Huntington, Manufacturers' Division, Chicago, Ill.; W. H. Klein, Chattanooga, Tenn.; Daniel J. Miller, Portland, Penn.; M. A. Neville, Lafayette, Ind.; Harold V. Owens, Utica, N. Y.; J. M. Settle, Louisville, Ky.; J. L. Shiely, St. Paul, Minn.; Harris W. Snyder, Buffalo, N. Y.; Stephen Stepanian, Columbus, Ohio. Other producers present were C. F. Strasmer and Harry S. Stelley, Buffalo Gravel Co., and E. J. Nunan, Buffalo Slag Co. The Buffalo producers were hosts at a very delightful trip to Niagara Falls, with dinner in Niagara Falls, Ont., and at a golf party on the following afternoon.

Concrete Products

Cement Products

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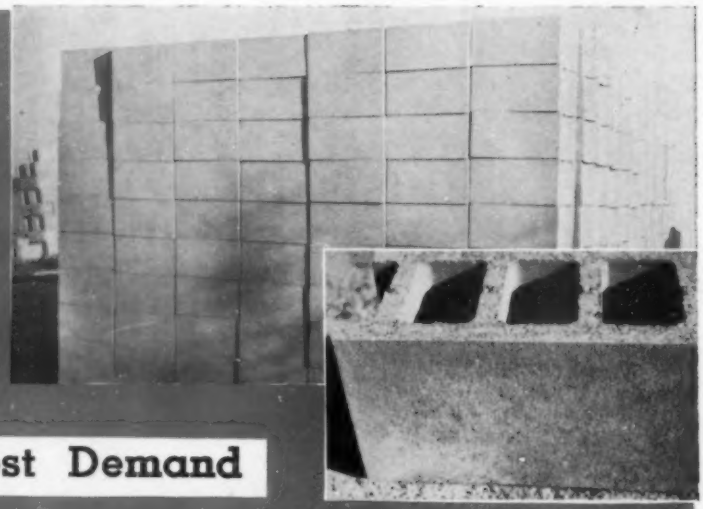

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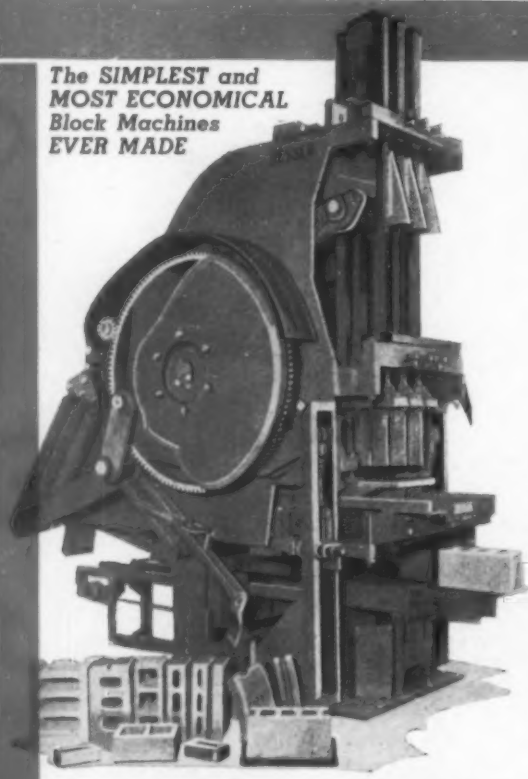

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The units with FULLY PRESSED TOP, made on Besser Plain Pallet Strippers, have created new interest and greater possibilities in the concrete products industry. Better appearance and more perfect surfaces and dimensions qualify them for better class construction. The market is broader, selling is easier and manufacturing more attractive and profitable. Units with FULLY PRESSED TOP are made only on Besser Plain Pallet Strippers.

A Milwaukee concrete products plant makes 16 different sizes and types of units, including rock-face block and tile and brick, on one set of Plain Pallets on their Besser Plain Pallet Strippers. Their saving in pallet cost has paid for their machines several times over.

A typical assortment of units made on ONE SET OF PLAIN PALLETS on any Besser Plain Pallet Stripper. The amount saved in pallet cost to make these units will buy the machine.

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Capacities from 500 to 4000 Units Per Day—A Size and Model for Any Size Plant.
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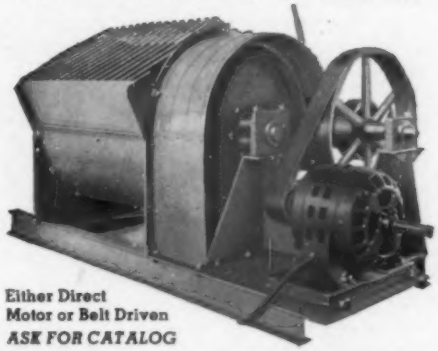
AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 50,000 units per day. For brick, slabs, coal cubes and other small units.

Ask for Besser Plain Pallet Stripper Catalog. State Production Capacity wanted.



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EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

FARM UTILITIES TO WORKS OF ART

Iowa Concrete Crib and Silo Co., Des Moines, Expands Profitable Business

By BROR NORDBERG

Plant and storage yard of Iowa Concrete Crib and Silo Co., Des Moines, Iowa

COMPLETE SERVICE to the customer and aggressive merchandising methods and follow-up of leads, usually through the architect and oftentimes before the prospect has contacted an architect, are bringing returns on a large scale for the Iowa Concrete Crib and Silo Co., Des Moines, Iowa. This is true for both its farm business and building construction in and around the city of Des Moines.

Originally, this concern was organized to manufacture concrete products for farm construction only, but in recent years the movement toward fire-safe, more permanent types of residential and industrial construction prompted it to add the manufacture of gravel- and cinder-concrete building units. The sale of concrete products for the building of these structures now represents more than one-half of the total tonnage produced.

Started in 1922 in Oskaloosa, Iowa, for the sole purpose of making precast units for farm buildings, the company moved to Des Moines in 1926. The development of a building block business was started in 1928, first with the cinder block and later with the sand-and-gravel-concrete block. At present, two-thirds of the demand in Des Moines is for the sand-and-gravel unit.

Service

Service to the customer cannot be over-emphasized. All concrete units that go into the construction of buildings which can be built, in whole or in part, of masonry blocks are kept on hand. If a customer asks for so many special units, the manager need not say, "We do not have them but will be glad to make them up for you." They are on hand at all times, on the theory that a business is unsound that will not completely meet the needs of its customers. Such a customer is pleased to know that he can get those special units *now*, and will undoubtedly return to fill his future requirements. In the long run, service like this will without question bring worthwhile return, directly or indirectly.

Many Unit Sizes

Another sound practice followed, for the purpose of offering service, and also to greatly enlarge possible outlets for building block, is manufacturing and having on hand units of variable thicknesses to meet all the requirements of builders, contractors and architects. For the larger buildings a 12-in. wall thickness is often specified. A relatively great volume of business is available in this type of building.

Among the units manufactured and on hand at all times are building blocks in 3-, 4-, 8- and 12-in. thicknesses, available in cinder or gravel concrete; all fractions including quarters, halves and three-quarters; corners and one-half corners; steel jamb and one-half steel jamb block; header blocks; three sizes of ashlar units in 4- and 8-in. thicknesses; cinder and gravel concrete lintels, which are available in multiple lengths from 2 to 7 ft.; sills; precast steps; cinder flue block; 8-in. joists; and either cinder or gravel concrete brick.

A concrete corn and grain crib built of ventilated crib block

Corn Cribs and Silos

Sales of precast silos and corn cribs to farmers in Iowa have been very remunerative. Silo and ventilated corn crib units are manufactured in standard 30x10x2½ - in. and 12x24x2½ - in. sizes respectively. These units are kept on hand in ample quantity, along with heavy tank staves and a stock of various sized standard door frames for the cribs and silos. In keeping with the policy of service, a line of building supplies needed in concrete masonry construction, such as steel sash and masons' cement, etc., is an adjunct of the business.

Early Strength Cement

High early strength cement is used exclusively in the manufacture of all products, whether they be the faster moving line or specials that are sold only occasionally. One of the main purposes is for uniformity in color. The plant itself has limitations which make the use of high early strength cement desirable.

Limited kiln space necessitates speeding up of the units through the kilns. Breakage of corners and the units themselves has been found to be minimized through the use of these cements; and space limitations for yard storage are not so serious when the units can be stacked higher as they are removed from the kilns. Also, when business is rushing, delivery can be made with safety two or three weeks after the units are made.

The Plant

Building block are made on a Besser and an Anchor machine, the plant capacity being about 3000 standard units an 8-hour day. Staves are manufactured on a New Monarch stave machine, and concrete brick are manufactured by a Papke brick machine. Cinders are shipped to the plant from Illinois by rail, and sand and gravel are trucked in.

Six kilns are used, two being set aside for the curing of concrete block. The capacity of these two kilns has been increased to 3000 standard units each by placing the units in tiers on planks running the full width of the kilns. Units are steam cured the year around, for 48 hours in the winter and 24 hours in the summer.

Selling the Products

Silo and corn crib units are sold throughout the state by direct contact through salesmen. Advertising is carried in the more important farm papers. Erecting crews, employed by the company, erect the crib or silo for the farmer.

All types of general building blocks are sold through contacting the architect and demonstrating the merits of concrete masonry construction, and oftentimes the prospective home-builder is contacted directly, in many cases before he has approached an architect. Many worthwhile leads are secured from building reports such as Dodge and from the national advertising sponsored by the Portland Cement Association. Some newspaper advertising is carried locally.

Generally, the building block business is limited to Des Moines and its immediate vicinity, but occasionally block are shipped as far as 200 miles by rail, on special jobs. From 60,000 to 75,000 units are stocked regularly, 10,000 usually being required for the average auditorium

ABOVE—Exposed cinder masonry features this Des Moines residence

BELOW—Foyer of a Des Moines theatre, showing cinder block in ashlar pattern

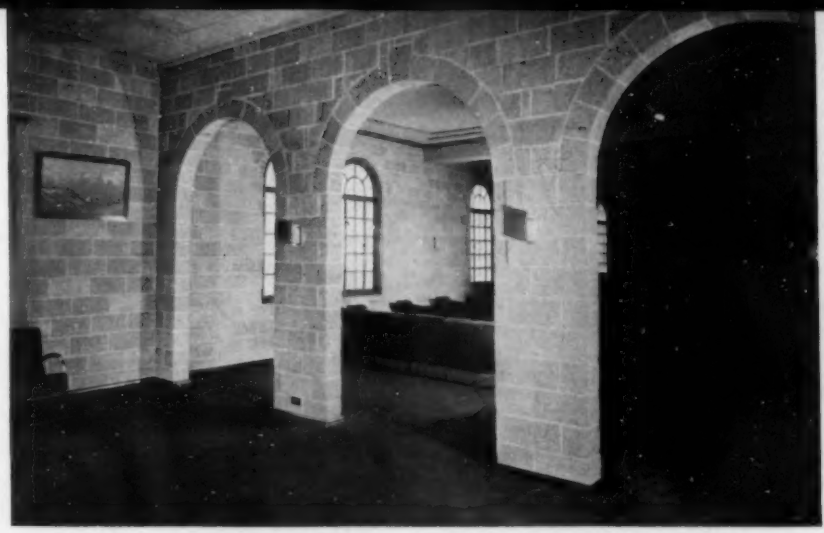
or large job. Among the outstanding jobs furnished with block during the past few years are nine theatres in Des Moines, three of which were built in 1935 and five in 1936.

Demonstration Office

The company has built a new office, which also serves as a demonstration of the use and application of practically every unit made. Joists, lintels, random ashlar, coursed ashlar and other units make up the interior of the building, to serve as an excellent advertisement to those calling upon the company. A meeting room is to be provided for holding regular social gatherings of architects, contractors, builders and others.

E. M. Cheesman is president of the Iowa Concrete Crib & Silo Co.; R. H. Stetson, secretary; Harve E. Kilmer, treasurer and general manager.

Silo built of concrete staves



Painted cinder block interior in random and coursed ashlar

Buys Concrete Block Business

BRUCE BRYAN, Findlay, Ohio, has purchased the concrete block plant of the late W. G. Hirscher, who died several weeks ago. Scott Firestine will manage the plant, which is to be improved.

Ready-Mix

EURNUP AND SIMS, builders, West Palm Beach, Fla., have recently gone into the ready-mixed concrete business.

"Certified" Concrete

TRIANGLE ROCK AND SAND CO., SAN BERnardino, Calif., has formed a new division, Triangle Certified Concrete, Inc., to mix and deliver ready-mixed concrete in mixer trucks to builders. Concrete is being delivered in Ford trucks with 3-yd. Jaeger mixers. George Thwing will manage the new division and Roy O. Stewart is in charge of transportation.

To Furnish Ready-Mix Concrete

EARL C. COOPER, Newton, Iowa, has been equipped to furnish ready-mixed concrete for use in Newton and the surrounding farming community. The concrete will be dual mixed by transit truck mixers.

Nice Concrete Pipe Order

WALLA WALLA CONCRETE PIPE CO., Walla Walla, Wash., has installed 2620 ft. of pipe for the Maple-Catherine-Bryant project.

For Better Service

ENUMCLAW CONCRETE PRODUCTS CO., Enumclaw, Wash., has moved its plant to the old Condensory building on Stevenson ave., Enumclaw. At the new location, a wider and better service will be made available to customers.

Cinder Crushing Machinery

BETHAYRES CONCRETE PRODUCTS CO., Bethayres, Penn., has installed modern cinder crushing, sizing and handling equipment. Among the machinery are a Link-Belt 21-ft. centers portable belt conveyor, a Link-Belt vibrating screen and a New Holland crusher.

Adds Concrete Block Machinery

RARDIN BROS. CO., Athens, Ohio, has installed a new power tamper block machine for the manufacture of 800 standard units in eight hours.

Jahncke Expands Ready-Mix

JAHNCKE SERVICE, INC., New Orleans, La., has constructed a new central ready-mixed concrete plant at its Claiborne ave. yard. Six new truck mixers have been added to increase the delivery fleet to 20 trucks. The new plant has Blaw-Knox 150-ton three-compartment bins, two 1-cu. yd. weigh batchers, a 650-bbl. bulk cement bin and a 2-yd. Smith tilting concrete mixer. An elevator is provided for use of either bulk or sack cement. The plant is fully automatic.

BELOW—Exterior and interior views of the new office building of Iowa Concrete Crib and Silo Co.

Special Form Coatings Provide

ATTRACTIVE FACES FOR CONCRETE

By NATHAN C. JOHNSON
The Con-Tex Corporation, Newark, N. J.

"CLOTHES MAY NOT MAKE THE MAN, but they make nine-tenths of him that is seen, and that counts a whole lot,"—as true today as when it was written.

The same may be said of concrete. And concrete, broadly speaking, is every branch of that great industry that employs portland cement as a binder for sand, for gravel and for rock products of various kinds and sizes, molded while plastic into units large and units small to serve some useful construction purpose.

ABOVE, Fig. 1—A cement-sand-grits mix of 1:1:6 granite-like effect for above grade walls (¾ natural size)

BELOW, Fig. 2—Acid wash effect on a 1:3 mix of mortar with builders' sand

The need for something besides the old fashioned cement face has long been felt in this great industry. Unfortunately, emphasis in investigation and in promotional work has heretofore been placed largely upon strength rather than upon appearance. Yet, as every worker with cement knows, strength is almost automatic, while a favorable appearance is the most difficult of all results to achieve.

These difficulties now seem to have been overcome by the use of specialized form coatings. These form coatings (or mold coatings) operate on the principle that, just as fire is necessary in any economical shaping of iron or steel, so that it may be formed while soft, in like measure the surfaces of molded cementitious products are best treated by controlled chemical processes while the mass is soft or plastic, rather than by attempting the task of beautification after the mass has set and hardened. The necessary chemical reagents are, of course, contacted with the concrete surfaces by means of these form coatings.

On these principles and by means of new discoveries and new controls and new methods, the Con-Tex Corporation has achieved remarkable results in the evolving of new products which now are ready for wide distribution in field use.

Applied to Fine Aggregates

By putting the new and specialized control referred to above into the familiar "Con-Tex," used for many years past for large aggregate but not for small aggregate mixtures, it has now been made possible to effect a surface "cut" of about the thicknesses of 3 sheets of paper. This specially-controlled grade of "Con-Tex" is called "Light Fancy Con-Tex" and some results of its use are shown in Figs. 1 and 2. Fig. 1 shows a cement-sand-grits mix of 1:1:6 thus treated; and Fig. 2 shows an "acid wash" effect on a 1:3 mix of mortar with builders' sand produced by coating the form with "Light Fancy Con-Tex."

While perfecting this light and controlled "cut," as illustrated, is in itself an achievement of no mean order, it has

further been found that by other means, new beauty as well as new utility can be conferred on the form skin itself, without removal, by the use of a different type of form coating called "Kaston."

Surface Patterns

"Kaston" does not remove the cement form skin but does mold it into an infinite variety of patterns which are producible at the operator's will and discretion. One advantage of the "Kaston" method is that the patterns produced are never twice alike. This gives in effect the wide variety of patternings that distinguishes nature from man-made products. It would, in fact, be difficult to duplicate the same pattern twice in full identity with "Kaston," thus automatically getting-away from the monotony of the usual cement face.

Some results of the use of "Kaston" are shown in Figs. 3, 4 and 5. These merely are examples of what may be done by common labor and by no means cover the range of effects that can be produced.

Where efflorescence is a factor, a liquid efflorescence-killer and waterproofer called "Protone" is available. "Protone" is applied after the hardening of the cement and can be applied to damp surfaces as well as dry surfaces and regardless of temperatures. "Protone" suppresses efflorescence effectively; and as it contains about 150 times as much solids as the usual waterproofers, it has proven very effective in practice.

$770,000 Bid

UNITED CONCRETE PIPE CORP., Los Angeles, Calif., was the low bidder on its estimate of $770,000 for constructing the Mad river water project pipeline, a bid $150,000 lower than the engineer's estimate.

Now Making Concrete Brick

PUYALLUP SHOPE BRICK CO., Puyallup, Wash., has installed a Dunbrick brick-making machine with a capacity of 1800 brick per hour. The company has in the past enjoyed its best business from the sale of concrete pipe and drain tile, the manufacture of which will continue.

Doubling Capacity for Concrete Pipe

SOUTHERN CONCRETE PIPE CO., Houston, Texas, is doubling its capacity to a daily output of 3600-3800 ft. of concrete pipe by the installation of an additional pipe machine. The company holds a patent on a "self-centering" ball joint which provides a 100% seat between sections of pipe. I. C. Spivey is owner of the concern and A. C. Spivey is superintendent.

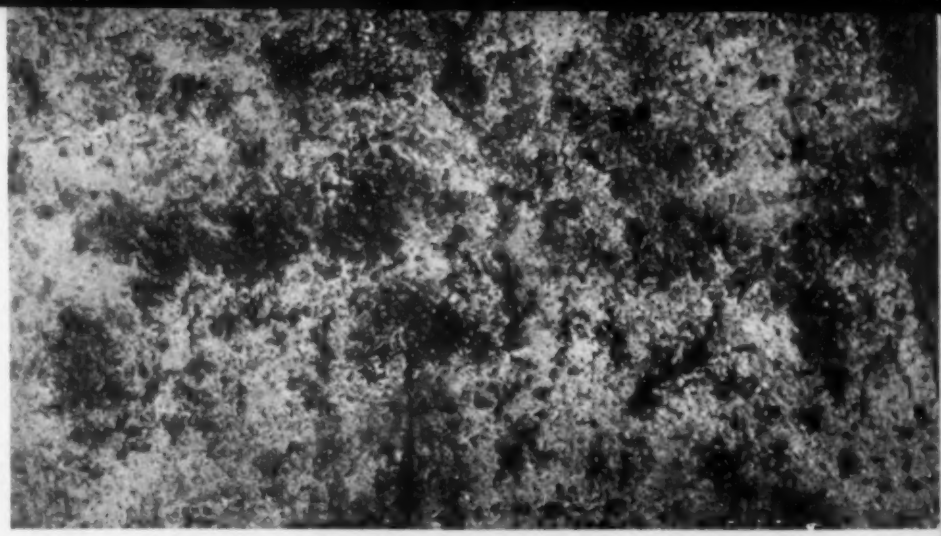
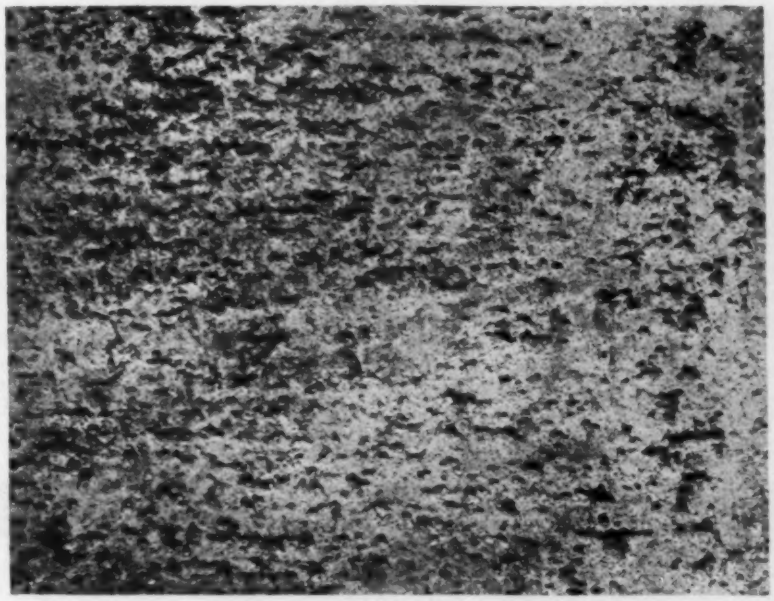


Fig. 3—Coral effect on mortar face of ordinary 1:2:4 concrete formed by brush being swirled around in spots on Kaston form coating (¾ natural size)



ABOVE, Fig. 4—Travertine effect on ordinary 1:2:4 concrete made by brush strokes in one direction

BELOW, Fig. 5—Tufa effect on form skin of ordinary 1:2:4 concrete. Brush used to stipple form coating (¾ natural size)

POROUS CONCRETE PIPE

for Irrigation and Drainage

By Lucius S. Flint

AN EFFECTIVE SOLUTION to the problem of conserving city irrigation water is provided by a unique type of porous concrete pipe now being produced in Denver, Colo.

The pipe has three main uses: for economical underground irrigation, for drainage and for well casings. The pipe for irrigation use was first tested at the home of F. S. Wendelken, Denver concrete contractor who is producing the pipe in coöperation with the Lock Joint Pipe Co.

The irrigation pipe is made of one part concrete to four of torpedo sand. The pipe is cast in simple molds consisting of a large washer at the end, an outside casing and a length of gas pipe in the center to form the opening. The large sized sand grains make the concrete extremely porous. When one end of a section is plugged and cigarette smoke is blown into the other end, the smoke will filter out all over the sides of the pipe.

Made in sections of 1½ or 2 ft. in length, the pipe is laid about 8 in. deep under the sod of the lawn to be irrigated. A line every 6 ft. is sufficient to give adequate irrigation. In the average small lawn, this means that only three or four lines have to be used.

The simplicity of installation is a major selling point. The customer's lawn only has to be disturbed at a few points and even there no deep trenches are necessary. The sod can be set right back in place and in a few days will settle to normal position.

The porous pipe has an inside diameter of about 1 in. with an equal wall thickness. The highly porous nature of the material may be judged from the fact that a full head of water from a city line—hydrant or hose—can be run in continuously and the pipe will never fill. This is in average ground. Under peculiar conditions, the results might be slightly different. Another interesting test is made by attaching a 2-ft. single section of the pipe directly to a hydrant and plugging up the opposite end. At the pressure provided here, the pipe section will never fill up.

Lines are laid with risers at the ends for filling the underground system. Where this is convenient, the city water may be connected directly to the concrete pipe. Otherwise, the water is turned into the pipe from a hose—through the riser.

"This method of irrigation has many advantages over the ordinary one," explains Mr. Wendelken. "In the first place, the water saving made possible is a large one. All runoff is eliminated. In large institutions, city parks and other places of that type, where water is paid for on the meter plan, the installation will pay for itself many times in a short period. For instance, at a government hospital near Denver, the annual lawn irrigation cost is about $1,100. We can save nearly two-thirds of that.

"In cities where all water is metered, the equipment represents a good investment in every private home. Even in places such as Denver where water is on a flat charge basis, the water departments are conducting campaigns for water conservation—through limitation of sprinkling hours and so on. Both the city and private individuals should welcome any device which will aid this effort.

"The convenience element is also an important thing to the private customer. All the trouble of moving a hose over the lawn is eliminated and sidewalks aren't gotten wet and muddy. At an installed cost of only 15c per foot, almost any homeowner can afford the installation. We plan to concentrate first on homes where the lawns are being torn up for some other purpose. Those people won't be at all skeptical about damage to their grass."

Drainage in Wet Land

The principle of the porous pipe can also be reversed for drainage use in wet land. One large potential market is on golf courses where the grass is given a great deal of water and sometimes becomes too soggy.

Here, a larger pipe is used and it is installed on a grade. The excess moisture seeps through the porous concrete into the inside of the pipe and from here has a clear runoff. Without this free getaway, the only other avenue of escape for the water is through evaporation—which takes time.

The size of the pipe used on drainage jobs depends entirely on the individual requirements. The farther apart the drainage lines are to be laid and the larger the water content of the land, the larger must be the size of the pipe.

The third use for the porous pipe is in well casings. Here, a much larger size is used. And, it is made with a correspondingly larger size of sand — a coarse gravel. The tubular pipe is put down in the well as a permanent casing, providing support for the dirt walls and at the same time allowing the water to seep through. The concrete casing is more durable than the ordinary galvanized casings—perforated ones—used for this work and is economical.

MERCHANDISING CONCRETE PRODUCTS

Part 8—Concrete Pipe

By H. O. Hayes

IN CONSIDERING the problem of merchandising concrete pipe, let's take up each major use of pipe separately. For the marketing problems vary with the use.

The principal markets for concrete pipe are for sewer systems, for culverts, for drainage, and for irrigation projects. Let's consider them in that order.

Sewer Pipe

Sewer pipe are usually sold in large quantities on a small number of projects. Sales are made either direct to municipalities or to contractors. There are usually only a few contractors who specialize in sewer construction within the shipping or operating area of most manufacturers of concrete pipe. The number of municipalities is greater, but in most cases only amounts to a few hundred. Naturally, only a few of these will install sewers in any one year. So that it is a comparatively simple matter to do intensive selling to all of the immediate prospects.

The best sources for prospects are sanitary engineers, who are among the first to know of proposed projects; contractors, who are always on the alert for jobs; and engineering reports, which may be found in both local and national construction magazines.

The importance of friendships is evident, for the friendly engineer and contractor can be of great help. Not only is their friendship valuable in developing prospects. It also assures an open

mind when specifications are written and pipe are bought. So reciprocity in "prospecting" will help to strengthen friendships.

Now, how can prospects be developed independently? By going after them, of course. A regular program of calling on city engineers, broadening acquaintances. Where there is no city engineer, the mayor. Or in larger cities, the engineer of the sanitary district.

A good way to make calls of this character be remembered by the official is to go to him with some interesting general fact about concrete pipe. An excellent selection of such material is available to members of the Concrete Pipe Association in the form of technical bulletins.

Contacts—Advertising

Naturally, personal calls on all town and city officials within the operating area of a concrete pipe manufacturer will require considerable time. And many may not be prospects for years. To keep in touch more closely, some form of advertising may be advisable. In many places an economical advertising medium may not be available. However, most states have a magazine published by the local Municipal League. And this may be satisfactory. Often local construction papers also have a satisfactory circulation.

An excellent alternative is a monthly letter, or house organ. With limited circulation, a large house organ is expensive. But even a 2- or 4-page piece, well done, can build a great deal of good will. And can develop both prospects and sales.

If it is decided to get out a monthly letter or house organ, enough time should be devoted to its preparation to make it readable for satisfactory results. That may mean a few jokes. Some personal items. And a good idea or two about your product. After all, it should be a personal call by you. And, since you are making several hundred calls at one time, it is well worth the time required to prepare a good sales letter to your friends. Make it talk for you. If you are successful in doing that, the people who get it will talk to you when you call on them personally. And in talking, you may get an opportunity to do some engineer or contractor a good turn, which helps in building friendships.

For the busy man, who hasn't the time to prepare a letter or house organ, a series of blotters may be sent periodically. Or a calendar may be given. Either of which help keep you before your prospect.

Sometimes an opportunity to do sales promotional work exists. Where sanitary or drainage conditions are extremely bad, it may be possible to force action by the community to correct the condition, thus creating a market for your pipe.

In doing this, a good procedure is to get some leading group of local citizens to sponsor the necessary program. When this can be done, local newspapers will become interested and with proper education can be enlisted in a fight for the improvement.

While local opposition groups will attack any one from out of town who takes part in fights of this character, it is often possible to assist in organization and direction of interested groups without taking active part in the fight. And when such promotion is carefully handled the promoter should be in a favorable position for the sale of his pipe.

Once a project is launched the problem is resolved to personal selling, which should be followed through with good pipe and good service. Good service should include insistence on proper placing of the pipe as well as delivery as desired by the buyer.

Culverts

Culvert sales may be both large and small scale. As long as we have gigantic road-building programs, and there is no let-down in sight, there will be extensive need for culverts. Quantities involved in a road contract are usually smaller than for a sewer project, however.

In addition to new road construction, there is always maintenance work, which consumes some pipe. There is also the highly specialized railroad market.

Selling concrete pipe for new road construction requires contacts with contractors, with state and county engineers, and with state, county and township officials, in some cases. City and town officials also use some pipe for culverts, but they provide a small part of the market.

The merchandising job may be carried out in much the same way as in selling sewer pipe, except that sales appeals should concentrate on the strength of concrete culverts, whereas with sewers both strength and acid resistance are of major importance.

If a monthly letter, or house organ, is used, it may be made to cover both subjects, and circulate to both groups. Many of the readers will be prospects for pipe for both uses. Naturally, bulletins of the Concrete Pipe Association on culverts can be used by members of the Association when making personal calls, stressing proper bedding of pipe, or depth of fills. These bulletins also provide good mailing pieces.

Advertising, or direct mail promotion, is most economical in reaching the maintenance jobs requiring pipe culverts, for unit sales are small. But they may be great enough to pay for all direct mail activities that are developing the larger volume jobs.

Selling the railroad field is specialized because the requirements are different, and sales must be made at the main office, which may not be economical to contact and serve. However, where satisfactory contacts can be established, it may be possible to obtain a good volume of business, for freight charges are eliminated and the railroad will ship considerable distances from a satisfactory source of supply. These requirements are essentially for maintenance needs, so that there is a definite limit to the potential market. Many roads are increasing maintenance now so the volume may increase.

Drainage

The market for drainage installations, aside from storm sewers, is for installations on roads and for farm drainage. A few manufacturers have developed special pipe for highway drainage work.

The marketing of these pipe is similar to marketing of culverts. A distinctive product may prove helpful in providing a sales feature. Such features may consist of perforated pipe, a pipe of porous aggregate, or special joints that facilitate drainage.

While there is still some demand for farm tile, except in newer areas this market is not of major importance. Where it is important, advertising in local papers may prove desirable, and personal promotion with county agents will prove valuable. It may be possible to get demonstrations made to groups of farmers. The value of such demonstrations is self-evident.

Irrigation

While the market for irrigation pipe is limited to comparatively small areas, the quantities required for such projects are substantial. Manufacturers have found the only satisfactory method of selling is to contract completed installations, so that control over the installation of the pipe can be exercised. Without such control, excess leakage in lines frequently proves a source of no little trouble and reacts unfavorably on the manufacturer.

As a result, moral and financial responsibility must be established in selling pipe for irrigation systems. Good performance records of installations is an important background, and the advertising is of institutional character, creating and emphasizing the high standards of the organization.

Miscellaneous

There are a number of miscellaneous uses of concrete pipe, most of which are for the farm. These include farm culverts and small road structures, and certain types of soil erosion dams and in soil erosion control.

Only small quantities of pipe are required for such jobs and little sales expense ordinarily is justified.

Once more the county agent may be of service. By getting his coöperation, a demonstration of how to install a farm culvert may be arranged. County agents are well acquainted with demonstration methods and how to make them successfully, so with their assistance a good attendance can be stimulated. Demonstrations of use of pipe for soil erosion control may also be arranged.

Showmanship

Other forms of showmanship have been used successfully by different manufacturers of concrete pipe, and are constant reminders to the public that a concrete pipe is a useful article and that it is conveniently available.

One prominent manufacturer built his office in the shape of a large concrete pipe, an excellent advertisement. Another built his office walls of pipe laid in mortar like logs, but maintaining the characteristics of the pipe. A manufacturer of irrigation pipe keeps a display of odd pipe shapes in front of his office. Still another manufacturer keeps a display showing the full range of sizes of his pipe, neatly arranged. Another has the largest size pipe he makes set up beside the smallest pipe, with a sign announcing that he can supply any need from the smallest to the largest pipe.

One manufacturer of sewer pipe has an attractive sign which he erects in a prominent place on every job where his pipe are installed, in an effort to get his pipe firmly established as "the" pipe for sewers. And another has occasional demonstrations to show how much his pipe exceeds the standard specifications for his product.

Many pipe manufacturers also find the manufacture of manhole blocks an ideal sideline for them, since the same buyers use both products in many cases. Other manufacturers have added septic tanks as a side line. These side lines can be developed into profitable departments of a pipe plant, and they are closely enough related in markets that it is an excellent combination.

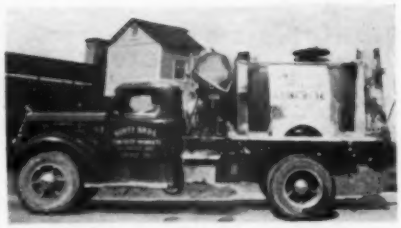
Through the merchandising methods described, and through the sale of closely related sidelines, the occasional buyer becomes conscious of concrete pipe and where to buy it, thus adding to profits in busy seasons, and helping the border line to keep on a profitable basis during dull periods.

Concrete Products Plant

NORTHERN CEMENT PRODUCTS CO., Petoskey, Mich., a new concern, is making units for a $30,000 home on Lookout hill near Petoskey. The plant is located at a gravel pit half way between Petoskey and Harbor Springs, which was acquired by the owners. Equipment includes a Besser Victory semi-automatic plain pallet stripper with a Besser 18-cu. ft. mixer and skip loader. Capacity of the plant is 3½ of the 8- or 12-in. sizes or rock face units per minute and seven of the 4- or 6-in. hollow slabs per minute.

Expands Line

KURTZ BROS., Ephrata, Penn., have expanded their concrete products line to include ready-mixed concrete, having just installed a new Blaw-Knox batching plant and three Jaeger 1½-cu. yd. mixer trucks. The Blaw-Knox batching plant includes a 2-cu. yd. batcher and 3-compartment 110-ton bin. The interesting thing about the plant is that it serves a community of only 15,000 population. The concrete products made include burial vaults, milk coolers, garden furniture and a full line of building units.



Type of truck used by Kurtz Bros.

Concrete Pavement Yardage

AWARDS of concrete pavement for May, 1937, have been announced by the Portland Cement Association as follows:

Type of Construction	Sq. yd. awarded during May, 1937	Total sq. yd. for year to date May 29, 1937
Roads	5,494,903	15,505,649
Streets	1,068,031	4,443,627
Alleys	76,216	137,880
	6,639,150	20,087,156

New batching plant of Kurtz Bros.

Kurtz Bros. concrete products plant

Pre-mixed Plant

YORK CONCRETE CO., INC., York, Penn., operates one of four plants owned by the Reading Ready-Mixed Concrete Co., which has two in Reading, Penn., one in Lancaster, and this new one in York. The York plant is shown in the accompanying views, and is typical. It has a capacity of about 300 cu. yd. per day. Ten 3½-cu. yd. mixer, or agitator, trucks, 6 Clintons and 4 Jaegers, on Mack chassis, are used.

Cement is received in bulk in hopper-bottom cars and conveyed by bucket elevator to a 900-bbl. steel bin. Aggregates are handled by a steel derrick and clam-shell bucket from stock piles to bins. The bins are Blaw-Knox and hold 70 tons each. The aggregates and cement are proportioned on Howe scale "Weightographs" and mixed when desired in a Ransome 2-cu. yd. mixer.

Plant of York Concrete Co.

Shipping Concrete Pipe

THE AMERICAN CONCRETE AND STEEL PIPE CO., Ogden City, Utah, is shipping concrete pipe for use on the city water line in Ogden canyon, major unit of the $750,000 waterworks project, for which it has the contract. The pipeline will be 27,000 ft. in length when completed.

Seeking Plant Site

MILLER CONCRETE PIPE CO., Valdosta, Ga., is reported to be opening an office and storage yard in Savannah, Ga., as soon as a suitable location may be secured.

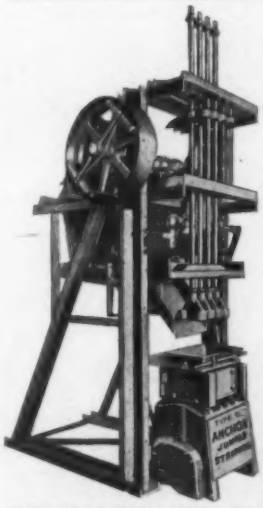
Lose Sales Tax Suit

ALABAMA CEMENT MANUFACTURERS are liable for the state 2% sales tax, according to a ruling in the Montgomery Circuit court issued in a case brought against the State Tax Commission by several cement concerns.

Talc Shipments Are Good

CHATSWORTH, GA., talc operators are reported to be very busy shipping talc dust and pencils. One of the plants, the Georgia Talc Co., is running on two shifts and shipping two cars of talc each day.

"ANCHOR"



Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for new plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

Bucket elevator and 900-bbl. steel bin

SPECIAL AGGREGATES

SPARKLING MARBLE
SPARKLING GRANITE
All colors—all sizes
TAMMS SILICA COMPANY
228 North La Salle Street Chicago, Illinois

CEMENT COLORS

CEMENT COLORS
Will not fade—extra fine and strong
TAMMS SILICA COMPANY
228 North La Salle St. Chicago, Illinois

SPRAY CONCRETE
BLOCKS—VAULTS—WALLS
Ornamental Casts, etc.
with ADJUSTABLE CEMENT SPRAY
$15.00 and $17.00
Eureka Art Stone Works
Box 602, Eureka, Calif.

STAR and ANCHOR COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

Silicosis Prevention Rules

NEW YORK STATE LABOR DEPARTMENT'S silicosis prevention program under a recent act of the legislature has led to the adoption of these rules, which apply to all rock drilling in silica-bearing rock which rock is divided into two classifications:

(1) "Any rock formation of substantially uniform geological character having free silicon dioxide as a component part which is known from geological studies or otherwise can be shown by the applicant (rock drilling employer) to the satisfaction of the Industrial Commissioneer, to run uniformly less than ten (10) per cent by weight of the rock formation.

(2) "All rock formations having free silicon dioxide as a component part, ten (10) per cent or more by weight, and all other formations, natural and synthetic, having a variable and unpredictable content of free silicon dioxide."

The rules define "injurious silica dust concentration" as "dust produced from drilling silica-bearing rock which is in excess of the following values as determined by an approved dust count method:

(1) "One hundred million (100,000,000) particles per cubic foot of air (as specified in No. 1 above).

(2) "Ten million (10,000,000) particles (as specified by No. 2 above)."

All rock-drilling operations must be executed so that there will be no dissemination of injurious silica dust concentration into the atmosphere. Dust control may be effected by suction or exhaust, and wet methods when approved by the Industrial Board, and other methods which may be invented or developed in the future, providing they are approved by the Board. The new rules further provide for procedure and standards of tests to which dust control equipment shall be submitted for approval, and for inspections of such equipment during operation.

The Labor Department has established a field laboratory in a granite outcropping at Letchworth Village in Rockland County where dust control devices have been and are being tested for official approval. Devices which already have been tested were reported to the Industrial Board on April 29.

Doubling Cement Capacity

CONSOLIDATED CEMENT CORP., Chicago, Ill., is doubling the capacity of its Fredonia, Kan., plant. The Mildred, Kan., plant is being razed, after which most of the equipment will be moved to Fredonia.

Repairing Plant

WABASH PORTLAND CEMENT CO., Stroh, Ind., plant, is undergoing repairs to machinery and equipment in anticipation of resuming operations.

Outgrows Plant—Moves

BREMERTON CONCRETE PRODUCTS CO., Bremerton, Wash., has removed its plant to 16th and Thompson sts., Bremerton, having outgrown the old location in the company's three years of existence. The new plant is completely modern and will manufacture all sizes of sewer and culvert pipe along with a complete line of concrete building products.

Record Cement Shipments

PACIFIC NORTHWEST CEMENT PLANTS are shipping about 80,000 bbl. of cement weekly for use at Grand Coulee, a new high in demands.

Injured by Laboratory Explosion

TRINITY PORTLAND CEMENT CO., Houston, Tex., plant suffered injuries to two employes recently from an explosion in the building housing the company's laboratory and office.

THE BEST BLOCKS
are made on
"COMMERCIAL"
Presteel Pallets

Quicker and Uniform Drying
Light in Weight — Easy to Handle
Will Not Break

LOWER IN PRICE THAN PLAIN PALLETS

and Require Less Drying Space
Original Machinery Cost is Lower
on Machines Using Cored Pallets

Cost of attachments for different widths or lengths of units is enough less than corresponding attachments on plain pallet machines, in many cases, to pay for the additional pallets required.

We make all sizes and styles of Pallets—let us quote your requirements.

THE COMMERCIAL SHEARING AND STAMPING COMPANY
YOUNGSTOWN OHIO

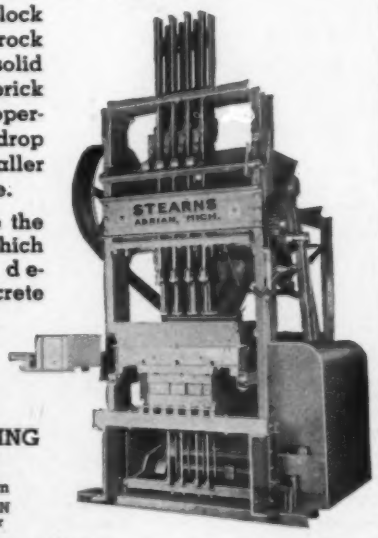
Why not ask us to *prove* it!

We stand ready to prove that the Stearns Stripper illustrated in this advertisement will consistently turn in the highest production per man of any machine on the market.

Makes fine block *fast*—plain or rock face, any size—solid or cored—also brick and tile. Power operated, with long drop 8-bar tamper. Smaller models available.

We also make the Stearns Mixer which is particularly designed for concrete products plants.

Write today for bulletins.



STEARNS MANUFACTURING COMPANY
Adrian, Michigan
EUGENE F. OLSEN
General Manager

The "Last Word" in Offices

UNIVERSAL-ATLAS CEMENT CO., Chicago, Ill., is planning the erection, at a cost of about $50,000, of a new office building at Leeds, Ala., that will be air-conditioned and serve as a permanent advertisement of cement. An outstanding firm of architects has been engaged to draw the plans.

Will Make Rock Wool

ALVA HANCOCK, Brownstown, Ind., is reported to be seeking a site in North Vernon, Ind., for a new rock wool plant. The limestone in this vicinity is said to be qualified for the manufacture of high-grade "wool".

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JOHNS-MANVILLE, New York, N. Y., is to build a $1,000,000 plant at Watson, Calif., near Los Angeles, to produce rock wool and transite asbestos-cement pipe. This project is in addition to the corporation's $3,420,000 factory expansion program announced in February.

Receiver Appointed

ROCKWOOL CORP., Brantford, Ont., Canada, at a meeting of noteholders had Rutherford Williamson, Toronto, appointed receiver. The corporation had accumulated an operating deficit of $95,000. Production and plant capacity are likely to be increased to enable profitable operations of the plant.

New Slag Corporation

CAMBRIA SLAG CO., Sharon, Penn., a new concern, has purchased the Sharpsville and Johnstown plants of the Standard Slag Co. and is planning to enlarge them. Harold Turner and Howard Brent will be in charge at Sharon and John Smith will continue in charge of the Sharpsville operations.

Mica Recovery Plant

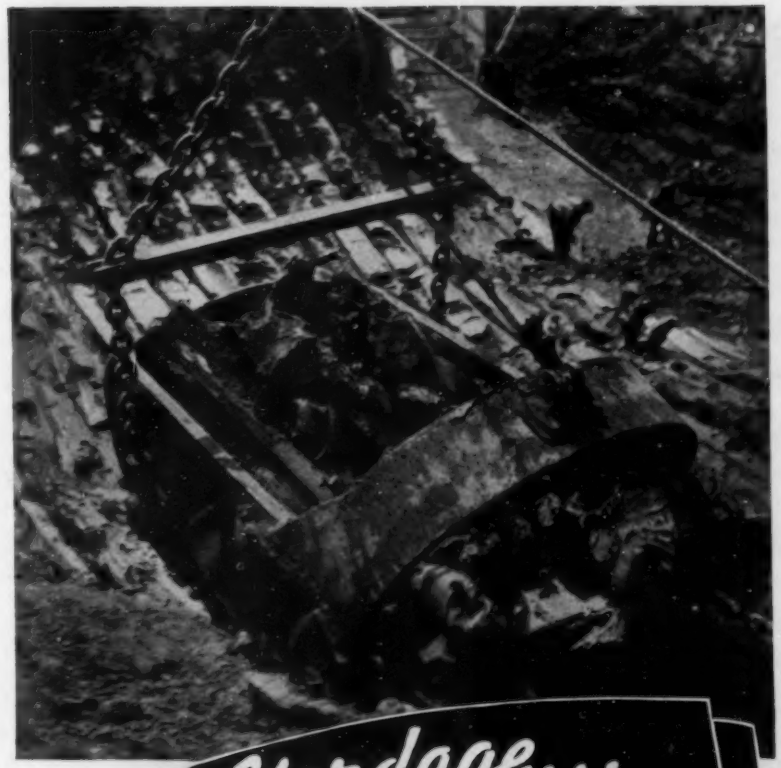
ENGLISH MICA CO., Spruce Pine, N. C., has started operation of a mica recovery plant in Yancey County, N. C., to produce raw material for the grinding plant at Spruce Pine.

To Make Concrete Pipe

C. E. BATES, Ada, Okla., oil man, is building a concrete pipe plant at Tishomingo, Okla., for the manufacture of 4- to 60-in. diameter pipe. The plant is being constructed near a ready supply of granite stone, which will be used for aggregate.

New Ready Mix Plant

SAN GORGONIO ROCK CO., Palm Springs, Calif., is installing a ready-mixed concrete plant two miles northwest of Palm Springs to begin operations about August 1.



More Yardage... More Profit... FROM YOUR DRAGLINE MACHINE with a PAGE AUTOMATIC BUCKET

Users Report 20% to 50% Increased Yardage-- Read What They Say:

***One AUTOMATIC user writes:**
"We were amazed at the way the AUTOMATIC Bucket handled the hard material, especially on the slopes. We feel sure that we can figure an increase of 25% in yardage with the AUTOMATIC."

***A Contractor reports:**
"Since putting on your AUTOMATIC, we are stripping 50% more material."

**From letters in our files.*

You also can increase dragline yardage and profit, with a patented rounded-front Page AUTOMATIC. Your equipment dealer will gladly recommend an AUTOMATIC best suited for your machine and job—or write us direct.

BUILT IN SIZES 3/8 to 15 CUBIC YARDS

DIG WITH A PAGE AUTOMATIC!

PAGE ENGINEERING COMPANY
CLEARING POST OFFICE CHICAGO, ILLINOIS

Digest of Foreign Literature

By F. O. ANDEREGG,

Consulting Specialist in Building Materials, Newark, Ohio

The Hardening Problem of Lime Mortars—This subject is carefully reviewed by I. R. V. Rodt, who points out that our present knowledge is quite inadequate to explain the phenomena observed. The explanation involving colloidal reactions with a gradual shrinkage and pulling together as water is lost seems to fit in well with many of the properties observed for lime mortars, but the necessary proof, based on adequate experimental studies, is too inadequate to be satisfactory. Here is an opportunity for some very nice work with X-rays working with hydrates prepared under carefully controlled conditions. *Tonindustrie Zeitung* (1937) 61, No. 12, p. 147; No. 13, p. 156; No. 14, p. 168.

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The Properties of High Magnesian Cements—The problem of using dolomitic limestones in making portland cement is of such economic interest that it has been investigated at the Kaiser Wilhelm Institute fuer Silicatforschung by H. E. Schweite and H. zur Strassen. The proposal had been made by Balthasar in Austrian patent 127,153 to prepare a portland cement from dolomite by using higher burning temperatures for longer periods of time than is customary. Two batches of cement had been made on a commercial scale from dolomite and while one had fair strength the other was very poor, although differing only slightly in chemical composition.

The present phase rule knowledge of the systems involved was first carefully considered, the most interesting point being what becomes of the MgO. Balthasar suggested that the addition of excess iron oxide, an important detail in his proposal, caused combination with the magnesia, rendering it quite inactive. The possibility of calcium ferroaluminate, C_4AF, taking up MgO was considered and investigated with the aid of X-rays. By comparing the intensities of lines obtained with mixes of MgO and C_4AF before and after sintering, it was found that about ½ mole of the former was taken by each mole of the latter. This means that in ordinary portland cement with C_4AF content of about 10 to 15%, something like 0.2 to 0.3% on a basis of the total cement will be MgO in solid solution in the iron compound. An interesting thing is the color of the mixed crystalline material. As MgO is added the color changes from brown to olive green.

Phase rule diagrams indicate the strong probability that the bulk of magnesia is present in portland cement and especially in Balthasar cement as periclase. X-ray spectra of the cements prepared from dolomite contained strong periclase lines and by comparing these with the lines obtained with mechanical mixes of MgO and NaF an estimate was made of the MgO content, which came out very close to the chemical analytical result. This observation indicates that magnesia is probably present as periclase.

Another very important question to be answered is whether MgO either reacts with some of the acidic oxides or prevents them from combining with CaO. This is especially important when metallurgical slags are used in making cement, as in such substances the magnesia is in combination with silica. Therefore, fosterite $2MgO.SiO_2$ and akermanite $2CaO.MgO.2SiO_2$ were mixed with precipitated chalk and heated at 1250 deg. C. for two minutes. Of the former about 80% had been changed, while with the latter all had undergone reaction, with the formation of all possible intermediate compounds, including merwinite $3CaO.MgO.2SiO_2$ and mixed crystals of that compound and $\beta 2CaO.SiO_2$, the end product. The speed of these reactions removes all doubt as to any interference by MgO with the cement-forming reactions. On heating mixtures of 2 CaO, MgO and SiO_2 and of 4 CaO, 2MgO, Al_2O_3, and Fe_2O_3 to 1000 deg. C. the di-silicate was formed at once with some 10 to 15% merwinite, which changed over slowly at this temperature until only periclase of Mg compounds was present, in the first mix. As a matter of fact, the presence of the MgO actually seemed to speed up interaction between lime and silica. The second mix formed C_4AF almost immediately, of brown color, which changed slowly to olive green as it took up MgO. Mixed spinel crystals were formed and on treating the product with dilute HCl an insoluble residue was left of spinel in which the iron-alumina ratio was close to 1:1.

These results indicate that magnesia may enter slightly into ordinary clinker formation through the formation of very transient intermediate compounds. In the case of the Balthasar cement, however, they may be expected to play a somewhat more important role. However, in the latter case the excess iron addition must be considered, as it uses up lime which is ordinarily available for the formation of the very important trisilicate. If a little too much iron is present none of this compound is formed and the excess iron, and probably part of the alumina also, react with some of the MgO to form spinels. The rest of the MgO is present in a very inert form; nevertheless, as to whether the product so formed is actually sufficiently inert toward water over long periods of time, is one that cannot be answered without waiting. Hence it is recommended that we should wait and see how these cements stand up over a period of years. *Zement* (1936) 25, No. 49, p. 842; No. 50, p. 863; No. 51, p. 861.

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The Action of Alkali Chlorides on Cement and Concrete—Solution of 2N and saturated sodium and potassium chlorides, as well as distilled water, were shaken with eight different brands of cement, including, one standard and three high early strength portlands, one blast furnace and one ore (iron) cement, in addition to two aluminous cements for 14 days at 17.5 deg. C. by F. Hundeshagen, of Stuttgart. The solutions were analyzed for silica, alumina, magnesia, lime and both phenolphthalein and methyl orange alkalinity. For comparison, freshly hydrated pure lime was treated in the same way and after analysis of part of the solution, a small amount of freshly precipitated and washed aluminum hydroxide was added to the lime mixes. Some experiments were also run on concrete of various ages and after treatment with CO_2.

In addition to the usual leaching action of distilled water, the chloride solutions cause base exchange reactions to take place. The calcium chloride resulting may form a basic chloride or it may react with aluminates present to form calcium chloroaluminate. Distilled water leached small amounts of alkalies out of the cement, but little silica or alumina was taken up by any of the solutions. Freshly precipitated aluminum hydroxide may partially dissolve in the alkali set free and then react with lime to form crystalline aluminate. From the aluminous cements, depending upon the physical structure, which may be determined by the conditions of hydration and the age, the caustic alkali set free early in the game may dissolve alumina, or if properly densified, the alumina may be almost inert to any such action. This is probably the reason for the variation in results which has been noted with aluminous cements in contact with sea water.

If concrete has an opportunity of becoming carbonated, its resistance to the attack of alkali chlorides is greatly improved, and the attention of people having to work with concrete in contact with sea water is called to the desirability of promoting carbonation before exposing. *Zement* (1937) 26, No. 7, p. 103; No. 8, p. 117.

THE INDUSTRY

New Incorporations

Cooley Gravel Co., Indianapolis, Ind.; reorganization, capital stock, 1000 shares no par value.

Ohio Valley Slate Co., 108 S. Pennsylvania St., Indianapolis, Ind.; Milton N. Simon, resident agent.

Seneca Stone Co., Tulsa, Okla.; capital stock, $25,000. Incorporators are G. E. Williamson, C. R. White, J. D. Wright.

Wisconsin Concrete Corp., Madison, Wis., to deal in cement, lime, plaster, etc.; 600 shares no par value. Incorporators are Eric Ranzen, A. A. Stromer and James B. Reid.

Ready Mix Concrete, Inc., Milwaukee, Wis.; to deal in cement, lime and gravel; 100 shares at $100 each. Incorporators are Clifford, Everett and Lawrence Vander Heyden, and W. W. Rockteschel.

Stone Products Co., 165 West Wacker Drive, Chicago, Ill.; to deal in lime and limestone; 10,000 shares no par value, common. Incorporators are R. J. Dalton, J. S. Van Leer, and A. Limburg.

Ribstone Silo & Construction Co., Anamosa, Iowa; to manufacture and deal in building materials; authorized capital stock of $10,000 divided into 100 shares of $100 each. Incorporators are A. B. White, C. Hartman, and W. S. Frazier.

Kendrick Sand and Gravel Co., Muscogee County, Ga.; capital stock $5000 divided into shares of $100 for the purpose of producing, selling, buying and marketing sand, gravel, pottery, building materials, dirt and concrete products, and to operate sand and gravel pit or quarry. Incorporators, Thomas K. Kendrick and W. W. Kendrick.

National Gypsum Co., Buffalo, N. Y., has been authorized to do business in Virginia.

Highland Sand & Gravel Co., Camden, N. J., capital stock $6000. Agent, N. J. Corp., Guarantee & Trust Co.

Kaufman Koncrete Ko., Louisville, Ky., capital stock $1000. Incorporators, P. B. Muir, Foster Holt and F. H. Kaufman.

Stone Products Co., 165 West Wacker Drive, Chicago, Ill.; 10,000 shares, no par value. Incorporators R. J. Dalton, J. S. Van Leer, and A. Limburg. To deal in lime and limestone.

Kane County Sand and Gravel Co., Elgin, Ill.; 1000 shares no par value common. Incorporators are D. R. Murray, S. Jernberg, and C. Umholtz. For the purpose of operating gravel pit. Correspondent, Doris R. Murphy, 503 Ellis Ave., Wheaton.

Fleming Gravel Co., Inc., Columbus, Miss.; capital stock $10,000 divided into shares of $100, to lease sell, buy and operate lands containing gravel and other minerals. Incorporators are F. C. Fleming, Columbus, Miss., Nellie D. Fleming, Columbus, Miss.

Personals

B. C. Heacock, president, Caterpillar Tractor Co., Peoria, Ill., has been elected a director at large of the Chamber of Commerce of the United States.

Albert E. Frosch, head of the East Liverpool office of the Eastern Ohio Sand and Supply Co., was recently elected vice-president of the Northeastern Ohio-Western Pennsylvania regional planning committee at a meeting in Youngstown.

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

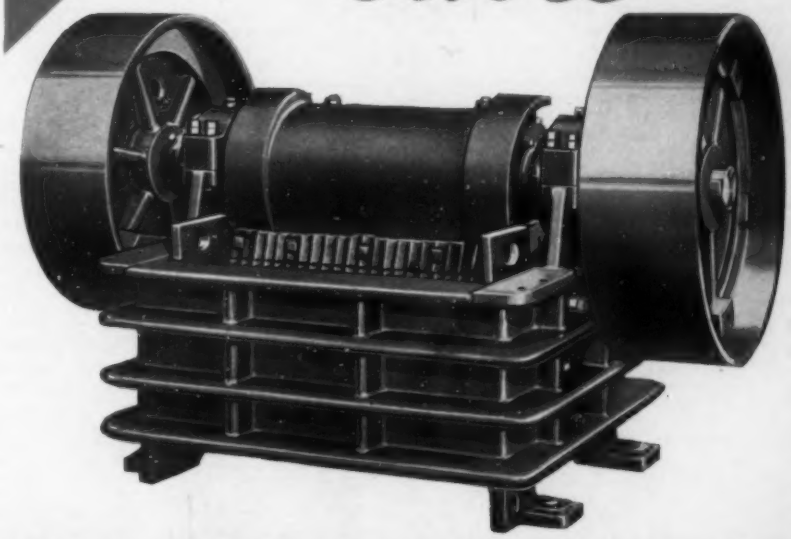
The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.
Established 1857

5909 Kennerly Avenue — St. Louis, Mo.
New York — Chicago — Denver
San Francisco — Portland — Seattle

A DIAMOND *Roller Bearing* CRUSHER *Saves* —



HORSEPOWER:
Power tests with electrical measuring instruments prove Diamond Crushers, under identical conditions, operate with 30% less power than the ordinary plain bearing type requires.

OIL:
The roller bearings are sealed in grease before leaving the factory and require about two pounds of grease a week. This represents a considerable saving over the large amount of oil used every day by plain bearings.

MAINTAINANCE:
The manufacturer of the bearings used in the Diamond Crusher guarantees the bearings for a minimum number of working hours which averages about two years. This guarantee is based on 25% of expected life.

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ESTABLISHED 1882
DIAMOND IRON WORKS INC.
MINNEAPOLIS, MINNESOTA

UNIVERSAL SCREENS

"GIVE UTMOST SATISFACTION"

Says Tennessee operator who has NINE Universal Screens in his various plants.

Their powerful screening action is maintained with equal intensity over every inch of the screening surface. There are no dead areas, and therefore—no blinding.

The best in Vibrating Screens—yet priced surprisingly low—$296 and up.

Write today for complete catalog

UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN

Hi-power ...The Bucket for Excavating

Contractors say "It's the best bucket we've ever used" . . . because it digs deep, fills full and stands up! It will dig BIGGER PAY LOADS for you. **Ask for Bulletin 237.**

Write, Wire or Telephone

HAISS

George Haiss Mfg. Co., Inc., Park Ave. & 143rd St., New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Conveyors—Bucket Loaders

George Poston, Superintendent of the Sparta, Tenn., plant of Thompson, Weinman and Co., Inc., for ten years, has been transferred to Boston.

A. S. Lane, Lane Construction Corp. and John S. Lane and Son, Inc., Meriden, Conn., has resigned as treasurer of both companies but will continue in his capacity of vice-president.

Obituaries

W. S. Walker, 66, president of the American Silica-Sand Co., Ottawa, Ill., died on June 15, 1937.

Charles O. Sutermeister, 69, president, A. Sutermeister Stone Co., Kansas City, Mo., died June 16, 1937.

Clinton H. Muller, superintendent of the Crosby Sand and Gravel Co., Seattle, Wash., died May 25 after a brief illness.

Andrew Nicholl, 68, who was active in the stone quarrying business for many years in Brownhelm, Ohio, died June 6, 1937.

Sheldon B. Dilley, 58, Wilkes-Barre, Penn., member of the firm of Dilley and Kemmerer, dealers in sand and gravel, died June 5, 1937, following an emergency operation.

Clinton H. Muller, 41, plant manager of the Crosby Sand and Gravel Co., Seattle, Wash., for the past ten years, died May 25 after an illness of only a few hours.

Joseph W. Reid, 57, mining engineer and planter, died in Memphis, Tenn., May 18 after a long illness. He served as consulting engineer on a number of Tennessee projects and designed the gravel washing process used by the Fischer Lime and Cement Co. at its Riverside plant.

Henry C. Hutchinson, 72, president, Hercules Cement Corp., Philadelphia, Penn., died May 25 after a month's illness. Mr. Hutchinson was a graduate of Wesleyan University and was active in the political life of Buffalo, N. Y. He was a member of the University Club, the Park Club, a 32nd degree Mason.

Winifred M. Kallasch, 60, vice-president of the Illinois Hydraulic Stone and Construction Co., Elgin, Ill., died June 8. During the world war, Mr. Kallasch was superintendent of the government's powder plant at Nitro, W. Va.

James A. Sunderland, 70, vice-president and director of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., died June 8. Mr. Sunderland was also chairman of the board of directors of Sunderland Bros. Co., Omaha, Neb., building supply dealers, at the time of his death.

Daniel E. Ritter, 63, first vice-president and general manager of the Lehigh Portland Cement Co., Allentown, Penn., died June 13 after a lingering illness. At the time of death Mr. Ritter was also president of the Allentown Steam Heat and Power Co. and a director of the Lehigh Valley Trust Co. and the Allentown Bethlehem Gas Co. He served a number of terms on the Allentown city planning commission and was chairman of that organization. In 1899, Mr. Ritter joined the Lehigh Portland Cement Co. as an engineer. In 1905 he was made construction engineer, became a director in 1915 and was elected first vice-president and general manager in 1926 after serving two years as second vice-president.

Sand and Gravel

M. Ross, Clyde, Kan., recently bought Cloud county's sand barge and pumping outfit, paying $500 cash and agreeing to deliver to the county 1500 cu. yd. of gravel.

Crushed Stone

Quaker City, Ohio: Operation of a new WPA stone quarry near town was to have been started late in May.

Paul Niemann, West Union, Iowa, has begun rock crushing at the Byers quarry for the production of agricultural limestone.

Cold Springs Granite Co., Cold Springs, Minn., has installed a battery of three stone crushers at its Morton, Minn., granite quarry.

La Crosse, Wis.: The county highway committee has received bids for the rental, with option to buy, of a portable rock crushing unit.

Cedar Rapids, Iowa: The city council recently leased the Larimer and Shaffer, Inc., quarries from E. R. Moore, receiver. The city will pay 5c a ton.

Lee's Summit, Mo.: The city has erected a rock crusher at Unity Farm and is producing road material, as part of a WPA project, for the cemetery and the city park.

Beloit, Kan.: The Mitchell County Highway Department recently purchased a new rock crusher with capacity of 15 to 20 tons per hour. Material for surfacing county roads, under a WPA project, will be produced.

Point Reyes, Calif.: It is reported that a large bay city concern has taken an option to lease some land from J. V. Mendoza for producing rock and gravel. It is believed this concern will erect a rock crusher and will produce material, to be shipped in barges, for construction work in the bay area.

Manufacturers

Syntron Co. has moved from Pittsburgh, Penn., to a new and larger factory at Homer City, Penn.

Cutler-Hammer, Inc., Milwaukee, Wis., announces the opening of a new branch office at 1106 Central Tower, Youngstown, Ohio, with E. J. Grove in charge.

Fuller Co., Catasauqua, Penn.; announces the appointment of Howard S. Sayre as manager of Chicago office, 1118 Marquette Building, effective July 1st.

Tractor and Equipment Co., Chicago, Ill., announces appointment of Harold G. Kirby as representative in northern Illinois, with headquarters at Rochelle, Ill.

The Byers Machine Co., Ravenna, Ohio, announces appointment of the newly organized Hillsman Equipment Co., Chicago, Ill., as its distributor for northern Illinois and northwestern Indiana.

Tractor & Equipment Co., Chicago, Ill., announces the opening of a new branch house at 631 S. Princeton St., Springfield, Ill., also that that Mr. "Don" Hipskind of the International Harvester Co. has been transferred to Chicago and is making his headquarters with the company.

Designer for Industry, Inc., Cleveland, Ohio, announces that they have established New York headquarters in the International Building, Rockefeller Center. H. C. Gooding, who was transferred from the Chicago office, will become business manager, George E. Henry sales promotion manager and Frank G. Banning chief engineer in charge of engineering development.

Caterpillar Tractor Co., Peoria, Ill., announces the following promotions: Louis B. Neumiller, director of industrial relations; L. J. Fletcher, assistant general sales manager; C. M. Burdette, manager of central sales division; C. A. Spears, manager of allied equipment sales; Merwin T. Farley, agricultural sales manager of eastern division; Floyd E. Rusher, assistant sales manager for central division.

W. G. Hulbert

Taylor - Wharton Iron and Steel Co., High Bridge, N. J., announces, through its board of directors, that William G. Hulbert has been elected vice-president, succeeding the late S. M. Buck. Mr. Hulbert was recently appointed general works manager and will continue his duties in charge of managing at both the High Bridge, N. J., and Easton, Penn., plants of the company.

Worthington Pump and Machinery Corp., Harrison, N. J., announces the appointment of J. J. Summersby, assistant vice-president, as general sales manager.

Lincoln Electric Co., Cleveland, Ohio, reports that its president, James F. Lincoln, is in England giving a series of talks at the invitation of various engineering societies and institutes.

General Refractories Co., Philadelphia, Penn., announces the recent election of S. M. D. Clapper as chairman of the board of directors, and of Floyd L. Greene as president. Mr. Clapper, who has been actively engaged in the management of the organization since 1933, continues management of its affairs of policy. Mr. Greene has been identified with the refractories industry for 25 years, having been general superintendent of the Standard Refractories Co. at the time of its acquisition by General Refractories Co. in 1922, and becoming successively district manager of Central Pennsylvania operations, general works manager, vice president in charge of operations, executive vice president and president.

S. M. D. Clapper

F. L. Greene

The Knightstown Concrete Co., Inc., Knightstown, Ind., has been dissolved.

New York Belting & Packing Co., Passaic, N. J., announces the appointment of the Eckerly-Johnson Co., Broad and 13th Sts., Chattanooga, Tenn., as distributors of their mechanical rubber goods in the Chattanooga district.

Harnischfeger Corp., Milwaukee, Wis., announces that L. T. McGuire, for 18 years with the Byers Machinery Co. of Ravina, Ohio, has recently joined its organization as divisional manager of the Large Excavator Division.

Waukesha Motor Co., Waukesha, Wis., announces that it will put into effect a vacation plan for shop men on August 1 whereby every hourly worker who has been in the company's employ since January 1, 1936, will receive a week's vacation with pay.

United States Rubber Products, Inc., New York, N. Y., announces that C. W. Gilmer, heretofore manager of mechanical sales, has been transferred to the New York office as belting sales engineer. L. F. Koepp, formerly salesman in the Seattle District, has been appointed to succeed Mr. Gilmer.

Stearns Magnetic Mfg. Co., Milwaukee, Wis., reports that A. A. Pederson, former sales manager for the United Iron Works, and S. O. Otrich of the former S. O. Otrich Co., San Francisco, have organized the Transmission Engineering Co. in the same city, and will serve as a Stearns agency.

Gar Wood Industries, Inc., Detroit, Mich., has appointed Charles W. Rhoades as special sales representative for the motor coach division. He will supervise sales in the Central United States territory. The company also announces the recent appointment of the following distributors: Ohio Equipment Co., Columbus, Ohio, and Oil Station Appliance Co., Indianapolis, Ind.

General Electric Co., Schenectady, N. Y., announces three promotions: H. A. Winne, manager of sales, mining and steel mill section, joins the engineering department as general assistant to Vice-President R. C. Muir. He is succeeded by J. J. Huether, hitherto manager of sales, machinery manufacturers' section. S. W. Corbin has taken over the position vacated by Mr. Huether.

Trade Literature

The following literature, recently published, is available, free, upon request to the respective sponsor:

Racks for electro-curing concrete block are illustrated in a 4-page form. THE CHASE FOUNDRY AND MANUFACTURING CO., Columbus, Ohio.

Diesel Engines. "The Dependable Diesel," 72 pages, illustrates and describes installations made in many fields by CUMMINS ENGINE CO., Columbus, Ind.

Mixers. Specifications for "HP" agitators and unit power agitators are shown in a 12-page booklet. PATTERSON FOUNDRY & MACHINE CO., East Liverpool, Ohio.

Air Filter. Bulletin 500-2, 4 pages, illustrates the Norblo round type automatic air filter designed for continuous service. THE NORTHERN BLOWER CO., Cleveland, Ohio.

Good Roads. A complete line of road building equipment and modern trends in road construction are presented in a 52-page book. BARBER GREENE CO., Aurora, Ill.

Couplings. Bulletin 4100, superseding 181 and 182, is a 36-page booklet which describes Falk Steelflex couplings. Installation photographs are included. THE FALK CORP., Milwaukee, Wis.

Portable Plants. "Iowa Super Straight Line Plants" are featured in a large broadside which illustrates various installations for stone and gravel. IOWA MANUFACTURING CO., Cedar Rapids, Iowa.

Cleaning Equipment. Catalog A182, 16 pages, deals with tools for cleaning dusty surfaces. The PC-150 portable vacuum cleaner is illustrated. U. S. HOFFMAN MACHINERY CORP., New York, N. Y.

Double Roll Crusher. Bulletin 262-D, 8 pages, introduces a new addition to a line of crushers, specifically intended to meet the requirements of secondary crushing. SMITH ENGINEERING WORKS, Milwaukee, Wis.

Self-Propelled Road Machinery. Action pictures, model views and photographic details of the features of "Automatic Patrols" are given in Form 4052. Diesel or gasoline-powered machines are available. CATERPILLAR TRACTOR CO., Peoria, Ill.

"The Cure for Precast Concrete" is a 4-page booklet describing the Electro-Cure Process for production of early shrinkage and high early strength in concrete products. THE TECHNICAL DEVELOPMENT CORP., Union Guardian Bldg., Detroit, Mich.

Ball Bearings. Catalog 10, 24 pages, describes ball thrust bearings, including spherical seat and multiple groove types, giving dimensions and dimension limits, load ratings and mounting instructions. AUBURN BALL BEARING CO., Rochester, N. Y.

Screen Cloth. Bulletin 98, 12 pages, describes screen cloth for vibrating screens. Tough, stiff and hard, cloth is shown in non-blind, non-spreader, lock crimp and double crimp weaves. Screens and conveyors are also shown. ROBINS CONVEYING BELT CO., New York, N. Y.

Diesel Power Units. In Bulletin 3600-A1 are described the construction and applications of Model 36 Diesel power units, which are offered as small as 2-cylinder sizes with rating as low as 10 hp. Other sizes, compact and completely self-contained, are also illustrated. FAIRBANKS, MORSE CO., Chicago, Ill.

Truck Body. Bulletin 103, 1 page, is devoted to Model W-84-HX, "Won-Way" truck body. The body has a special exhaust location above the cab and a crow's nest at the side of the cab for operator's convenience in controlling dumping and backing of the truck. EASTON CAR & CONSTRUCTION CO., Easton, Penn.

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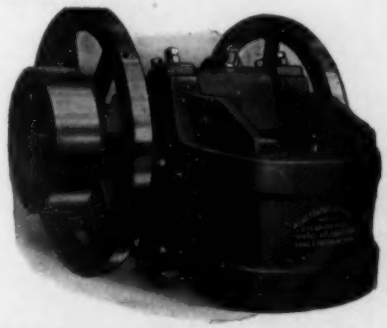
Complete Plants Designed and Equipped. Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment. Engineering Service.



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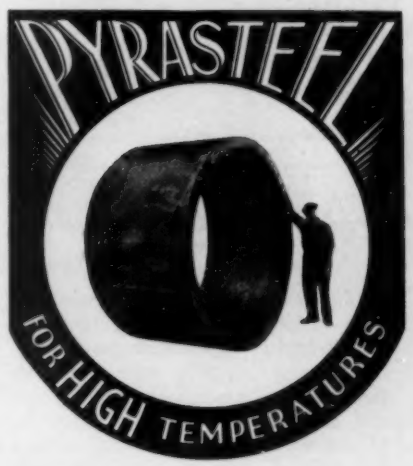

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The only one that was worn out was in service for over six years.

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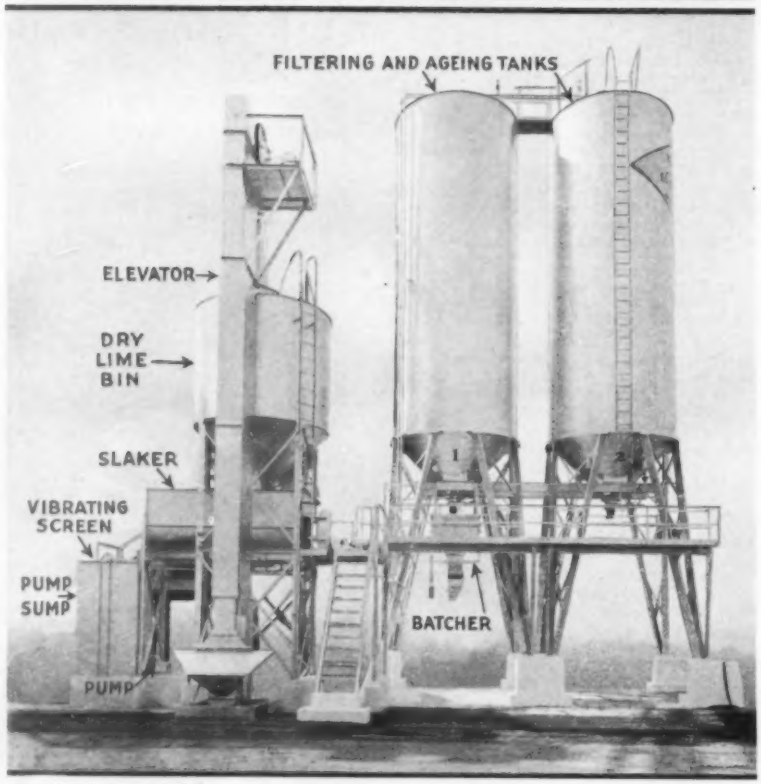
The BROOKS-TAYLOR Lime Putty Plant



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Tulsa.....1650 Hunt Bldg.
Houston.....2919 Main Street
Philadelphia.1651-1700 Walnut St.
Boston...1564 Consol. Gas Bldg.
San Francisco..1093 Rialto Bldg.
Los Angeles..1458 Wm. Fox Bldg.

Gauges. A 72-page catalog, No. 6703, deals with thermometers and pressure gauges and enumerates the wide range of industries to which they are applicable. BROWN INSTRUMENT CO., Philadelphia, Penn.

Flow Meter. Electrical and mechanical flow meters are non-technically described and colorfully illustrated in 56-page Catalog 2004. Liquid level controllers are also explained. THE BROWN INSTRUMENT CO., Philadelphia, Penn.

Drafting. A folder shows a new sketch pad set of tracing paper with a guide sheet with isometric pattern on one side and ⅛-in. squares on the other; a new adjustable irregular curve; etc. WADE INSTRUMENT CO., Cleveland, Ohio.

Quarrying Machinery Lubrication. Oils and greases as well as application guns and cups are taken up in Vol. 2 of the sixth edition of Keystone A.B.C. booklet, 12 pages. Wire cable treatment is featured in a separate folder. KEYSTONE LUBRICATING CO., Philadelphia, Penn.

Electrical Insulating Materials. A vest-pocket size, 36-page "guide book" gives specifications, prices and illustrations of tapes, sleevings and webbings, and also deals with transformer compounds, storage battery seals, soldering paste, insulating varnishes, etc. MITCHELL-RAND INSULATION CO., New York, N. Y.

Lubrication. Controlled lubrication for industry, which saves time, lubricant and machinery, is the subject of a 56-page book, Form 30-2. Specifications and prices are given for hydraulic, push type, pin type, button head, giant button head, dot and flush type systems and Alemite repair parts. STEWART-WARNER CORP., Chicago, Ill.

Bentonite Phenomena. "Water Impedance with Volclay Bentonite", Data No. 229, is a recent 12-page release presenting some hitherto unpublished conceptions on general properties and uses of bentonite, its resistance to water pressure, its swelling reactions, and its filter-cake forming properties. AMERICAN COLLOID CO., Chicago, Ill.

Crushing and Screening Equipment. Gravel and rock crushing, screening and handling equipment are featured in a new 24-page booklet. Inclined vibrating screens, revolving screens, steel storage bins, belt conveyors, idlers, crusher trailer units and quarry plants are illustrated. PIONEER GRAVEL EQUIPMENT MANUFACTURING CO., Minneapolis, Minn.

"Cement Guns" and "Gunite". Bulletin 1200, 68 pages, supersedes Bulletin 200 and describes and illustrates the machine called the "Cement Gun" as well as its sand-cement product, "Gunite". Suggested specifications for "Gunite" and applications for floor and roof slabs, reservoir linings, concrete reconditioning, etc., are included. CEMENT GUN CO., Allentown, Penn.

Tools. A new 52-page booklet, with over 60 illustrations of tools and machining operations, contains complete information on machining cast iron, malleable iron and various steels. Recommended speeds and feeds for machining a variety of materials, methods of obtaining longer tool life, and proper tool grinding practices are discussed. HAYNES STELLITE CO., New York, N. Y.

Wire and Cable. "Industrial Guide for the Selection of Wire and Cable" is an interesting 32-page booklet giving charts and advice in such factors as type of installation, relative importance of circuits, operating voltage, daily load cycle, conductor temperature, length and spacing of circuits, permissible over-all cable diameter, field limitations and exposures. ANACONDA WIRE & CABLE CO., New York, N. Y.

Welding Rods. "AMSCO Hard Facing Welding Rods" is an illustrated booklet covering a number of hard facing applications and suggestions for its proper application. A copy may be obtained from THE AMERICAN MANGANESE STEEL CO., 389 E. 14th St., Chicago Heights, Ill.

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For alphabetical index, see page 130

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Wickwire Spencer Steel Co.

Belting (Transmission)
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Hewitt Rubber Corp.
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Bins
Universal Road Machinery

Bins (Steel)
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Fuller Co.
Geo. Haiss Mfg. Co., Inc.
Industrial Brownhoist Corp.
Link-Belt Co.
Universal Road Machinery

Bins (Cement, etc.)
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Besser Mfg. Co.
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Owen Bucket Co.

Buckets (Dump)
Dempster Bros.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bulldozers
Blaw-Knox Co.
Koehring Co.

Cableways
American Steel & Wire Company
Broderick & Bascom Rope Co. (Yellow Strand)
General Electric Co.
Link-Belt Co.
John A. Roebling's Sons Co.
Sauerman Bros.
Wellman Engineering Co. (G. H. Williams)
Williamsport Wire Rope Co.

Calcinators
Bradley Pulverizer Co.
Traylor Engineering & Mfg. Co.

Calcining Kettles (Gypsum)

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Atlas Powder Co.

Car Pullers
Link-Belt Co.

Carriers
Barber-Greene Company

Cars (Dump)
Carnegie-Illinois Steel Corp.

Cars and Track, Industrial
Besser Mfg. Co.

Cars (Quarry & Gravel Pit)
Austin-Western Road Machinery Co.
Carnegie-Illinois Steel Co.

Castings
Babcock & Wilcox Co.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Chicago Steel Foundry Co.
Diamond Iron Works
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Castings (Grey Iron)
Cement Mill Equipment Co.

Cement Making Machinery
F. L. Smidth & Co.
Manitowoc Engineering Works
Traylor Engineering & Mfg. Co.

Cement Paints
Tamms Silica Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Blaw Knox Co.
Chain Belt Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain Drives
Chain Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Cement Mill Equipment Co.
Chain Belt Co.
Jeffery Mfg. Co.
Link-Belt Co.

Chain Elevating & Conveying Equipment
Cement Mill Equipment Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes and Chute Liners
American Manganese Steel Co.
Earl C. Bacon, Inc.
Manhattan Rubber Company

Clarifiers
The Dorr Co.
Hardinge Co., Inc.

Classifiers
The Dorr Co.
Hardinge Co., Inc.
Link-Belt Co.

Clips (Wire Rope)
Broderick & Bascom Rope Co. (Yellow Strand)
Diamond Iron Works
Williamsport Wire Rope Co.

Coal Crushers and Rolls
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Collars (Shafting)
Standard Pressed Steel Co.

Colors, Cement
Geo. S. Mepham Corp.
Tamms Silica Co.

Compressors (See Air Compressors)

Concentrators (Slurry, etc.)
The Dorr Co.

Concrete Breakers
Ingersoll-Rand Co.

Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co.

Consultants on Lime Production
Arnold & Son

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Barber-Greene Company
C. O. Bartlett & Snow Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors and Elevators
Allen Sherman Hoff Co.
Earle C. Bacon
Barber-Greene Company
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Works
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Huron Industries, Inc.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Universal Road Machinery
Williams Patent Crusher & Pulv. Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Conveyors (Spiral)
Jeffrey Mfg. Co.

Conveyoweighs
Richardson Scale Co.

Correcting Basins
F. L. Smidth & Co.

Actual photographs of a Gulf engineer consulting with the manager of a large Diesel power plant regarding lubrication. Every day, throughout 28 states from Maine to Texas, Gulf engineers are "in the picture" in scores of plants —helping to reduce operating costs through better lubrication with Gulf oils and greases.

HE KNOWS *Diesel Lubrication!*

Keep the Gulf Engineer "IN THE PICTURE" *in your plant*

IT'S A BIG PLUS VALUE! This engineering service, extended to users of Gulf Diesel lubricants is worth real money.

Here's the reason. Maintenance costs — say Diesel operators — have a direct relationship to the efficiency of lubrication. And — proper application of the right oils and greases protects cylinders, pistons and bearings against wear, avoids excessive carbon formation and saves the cost of overhauling.

The Gulf engineer's purpose is to increase the efficiency of Diesel operation through improved lubrication. His recommendations as to the selection and application of lubricants to Diesel equipment are a PLUS VALUE which Gulf users receive.

More than fifty of America's foremost Diesel engine builders have approved Gulf Diesel lubricants for the engines they build. Let a Gulf engineer recommend the best lubrication practice for your equipment.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION · GULF REFINING COMPANY

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

MAKERS OF GULF NO-NOX ETHYL GASOLINE AND GULFPRIDE OIL

Classified Directory—*Continued*

Couplings (Air Hose)
Ingersoll-Rand Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Huron Industries, Inc.
Link-Belt Co.
Standard Pressed Steel Co.

Couplings (Hose, Pipe, etc.)
B. F. Goodrich Co.
Hewitt Rubber Corp.

Cranes (Clamshell)
Bucyrus-Erie Co.
Koehring Co.
Manitowoc Engineering Works

Cranes (Crawler and Locomotive)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
Manitowoc Engineering Works
Northwest Engineering Co.

Cranes (Excavator)
Koehring Co.

Cranes (Overhead Traveling Electric)
Industrial Brownhoist Corp.

Crusher Parts
American Manganese Steel Co.
American Pulverizer Co.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.

Crushers (Hammer)
The C. O. Bartlett & Snow Co.
Carnegie-Illinois Steel Corp.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Earle C. Bacon, Inc.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Good Roads Machinery Corp.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co. (Jaw)
New Holland Machine Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Universal Road Machinery
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Austin-Western Road Machinery Co.
Earle C. Bacon, Inc.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Jeffrey Mfg. Co.
Traylor Engineering & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.

Crushers (Roll)
American Pulverizer Co.
Austin-Western Road Machinery Co.
Day Pulverizer Co., Inc.
Gruendler Crusher & Pulv. Co.
New Holland Machine Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Rotary)
American Pulverizer Co.

Crushers (Single Roll)
American Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Jeffrey Mfg. Co.
New Holland Machine Co.
Sturtevant Mill Co.

Dedusters
Blaw-Knox Co.

Detonators
Atlas Powder Co.

Dewatering Machines
The Dorr Co.

Diaphragms (Pump)
B. F. Goodrich Co.
Manhattan Rubber Company

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.

Dirt Moving Equipt. (Dumptor)
Austin-Western Road Machinery Co.
Koehring Co.

Ditchers
Barber-Greene Company
Bucyrus-Erie Co.

Draglines
Austin-Western Road Machinery Co.
Bucyrus-Erie Co.
Link-Belt Co.
Manitowoc Engineering Works
Northwest Engineering Co.
Page Engineering Co.

Draglines (Gasoline or Electric)
Koehring Co.
Manitowoc Engineering Works

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Sauerman Bros., Inc.

Dragline Excavators
Bucyrus-Erie Co.
Lima Locomotive Works, Inc.
Northwest Engineering Co.
Page Engineering Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Co.
Manhattan Rubber Company
Thermoid Rubber Co.

Drill Bits
Ingersoll-Rand Co.
Timken Roller Bearing Co.

Drills (Diamond Core)
Ingersoll-Rand Co.

Drill Sharpening Machines
Ingersoll-Rand Co.

Drill Steel
Ingersoll-Rand Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Ingersoll-Rand Co.

Drills (Wagon)
Ingersoll-Rand Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Combustion Engineering Corp.
Hardinge Company, Inc.
Manitowoc Engineering Works
W. S. Tyler Co.

Dumptors
Dempster Bros., Inc.
Koehring Co.

Dust Collecting Systems
Allen Sherman Hoff Co.
Allis-Chalmers Mfg. Co.
The C. O. Bartlett & Snow Co.
Blaw Knox Co.

Dust Conveying Systems
Fuller Company

Dynamite
Atlas Powder Co.

Electric Cables and Wires
Diamond Iron Works
John A. Roebling's Sons Co.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevator Belting (See Belting)

Emery Mills
Sturtevant Mill Co.

Engineers
The Dorr Co.
Fuller Co.
Hetherington & Berner, Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel)
Ingersoll-Rand Co.
Nordberg Mfg. Co.

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Austin-Western Road Machinery Co.
Koehring Co.

Excavators (Dragline)
Koehring Co.

Explosives
Atlas Powder Co.

Fans
General Electric Co.

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Earle C Bacon, Inc.
Besser Mfg. Co.
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc. (Weighing)
Jeffrey Mfg. Co. (Pan & Tube)
Robins Conveying Belt Co.
Smith Engineering Works (Plate)
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.

Furnaces
Combustion Engineering Corp.

Fuses
General Electric Co.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Gaskets
B. F. Goodrich Co.
Hewitt Rubber Corp.
Manhattan Rubber Company

Gasoline
Texas Company

Gears (Spur, Helical and Worm)
Jeffrey Mfg. Co.

Gears and Pinions
Chain Belt Co.
General Electric Co.
Link-Belt Co.

Gelatin and Semi-Gelatin (See Explosives)

Grapples
Blaw Knox Co.
Hayward Co.
Owen Bucket Co.

Grease
Gulf Refining Co.
Texas Company

Grinding Balls
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
Jeffrey Mfg. Co.

Grizzlies
American Manganese Steel Co.
Jeffrey Mfg. Co. (Vibrating)
Robins Conveying Belt Co.
Smith Engineering Works

Grizzly Feeders
Jeffrey Mfg. Co.
Traylor Engr. & Mfg. Co.

Hammer Drills
Ingersoll-Rand Co.

Hammer Mills (See Crushers)

Hoists
Ingersoll-Rand Co.
Jaeger Machine Co.
Link-Belt Co.
Northwest Engineering Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
B. F. Goodrich Co.
Hewitt Rubber Corp
Ingersoll-Rand Co.
Manhattan Rubber Company
Thermoid Rubber Co.

Hose Couplings (See Couplings—Hose, Pipe, etc.)

Hydrators
Blaw-Knox Co.

Insulation (Electric)
General Electric Co.

Kilns (Shaft)
Arnold & Son
Hardinge Company, Inc

Kilns and Coolers (Rotary
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Company
Hardinge Co., Inc.
Manitowoc Engineering Works
F. L. Smidth & Co.

Kominuters (See Mills)

Laboratory Crushers
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Lamp Guards
Flexible Steel Lacing Co.

Lighters, Hot Wire (For Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Company
Hardinge Co., Inc.
Link-Belt Co.
Raymond Pulverizer Division

Lime Kilns (See Kilns and Coolers, Rotary)

Lime Putty Plants
Chicago Bridge & Iron Company

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)
B. F. Goodrich Co.
Manhattan Rubber Company

Loaders and Unloaders
Barber-Greene Company
Bucyrus-Erie Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northwest Engineering Co.
Robins Conveying Belt
Universal Road Machinery

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel Electric)
Davenport-Besler Corp.
The Fate-Root-Heath Company

Locomotives (Diesel Mechanical)
Davenport-Besler Corp.

Locomotives (Gas-Electric)
Davenport-Besler Corp.
The Fate-Root-Heath Company
Jeffrey Mfg. Co.

Locomotives (Oil-Electric)
The Fate-Root-Heath Company

Locomotives (Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.

Locomotives (Steam, Gas and Electric
Davenport-Besler Corp.
The Fate-Root-Heath Company
General Electric Co.

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
Gulf Refining
Texas Company

Lubricants (Wire Rope)
American Steel & Wire Company
Broderick & Bascom Rope Co. (Yellow Strand)

Machinery Guards
Harrington & King Perf. Co.
W. S. Tyler Co.

The Big Brother to the Accordion Fold . . .

is a big help to the quarryman

Proper way to hold bundle: Note how the accordion folding permits the wires to open without kink or snarl.

Atlas now offers long wire Electric Blasting Caps in a new fold that provides new ease in handling and new effectiveness in use. The wire is folded in sections—and the pictures show how it is easily unfolded and extended without kink or snarl.

Atlas Electric Blasting Caps in the Big Brother Fold assure the utmost degree of convenience and efficiency. They likewise offer the safety provided by the regular Atlas Safety Shunt as well as the accuracy of the Atlas Match Head Detonator.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

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Boston, Mass.	Kansas City, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Denver, Colo.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Houghton, Mich.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

Classified Directory—*Continued*

Machinery Repairs
Cement Mill Equipment Co.

Magnets
General Electric Co.

Magnetic Pulleys
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Malleable Iron Castings
Cement Mill Equipment Co.

Manganese Steel Castings
American Manganese Steel Co.

Manganese Steel Parts
American Manganese Steel Co.

Material Handling Equipment
Austin-Western Road Machinery Co.
Jeffrey Mfg. Co.

Mechanical Rubber Goods
B. F. Goodrich
Manhattan Rubber Company
Thermoid Rubber Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
Hardinge Company, Inc.
Jeffrey Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Raymond Pulverizer Division
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Mine Handling Equipment
Chain Belt Co.

Mixers (Commercial Concrete)
Jaeger Machine Co.

Mixers (Concrete)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Koehring Co.

Mortar Colors
Geo. S. Mepham Corp.
Tamms Silica Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
General Electric Co.

Nozzles (Gravel Washing)
Chain Belt Co.

Nuts (Lock)
Standard Pressed Steel Co.

Oil Burners
Babcock & Wilcox Co.
F. L. Smidth & Co.

Oils (Lubricating)
Gulf Refining Co.
Texas Company

Packings (Pump, Valve, etc.)
B. F. Goodrich
Hewitt Rubber Corp.
Manhattan Rubber Company
Thermoid Rubber Co.

Paint (Asphalt)
Texas Company

Pallets
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Stearns Mfg. Co.

Pavers (Concrete)
Koehring Co.

Perforated Metal
Chicago Perforating Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Joseph T. Ryerson & Son, Inc.
Wickwire Spencer Steel Co.

Pipe Machines
Besser Mfg. Co.

Pipe Molds (Concrete)
Besser Mfg. Co.
Stearns Mfg. Co.

Plants (Crushing)
Austin-Western Road Machinery Co.
Good Roads Machinery Corp.
Traylor Engineering & Mfg. Co.

Plants (Sand and Gravel)
Austin-Western Road Machinery Co.
Good Roads Machinery Corp.
Traylor Engineering & Mfg. Co.

Plants (Stone Crushing)
Austin-Western Road Machinery Co.
Traylor Engineering & Mfg. Co.

Plates (Double Corrugated)
Hendrick Mfg. Co.

Pneumatic Drills (See Drills)

Portable Compressors
Ingersoll-Rand Co.

Portable Conveyors
Barber-Greene Company
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.

Portable Crushing and Screening Unit
Austin-Western Road Machinery Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Portable Loaders
Geo. Haiss Mfg. Co., Inc.
Jeffrey Mfg. Co.

Powder (Blasting)
Atlas Powder Co.

Power Tampers
Besser Mfg. Co.

Power Transmission Machinery
Chain Belt Co.

Power Transmission Equipment
Standard Pressed Steel Co.

Pulleys
Huron Industries, Inc.

Pulleys, Magnetic (See Magnetic Pulleys)

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
New Holland Machine Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Universal Road Machinery
Williams Patent Crusher & Pulv. Co.

Pumps (Acid, Centrifugal)
Ingersoll-Rand Co.

Pumps (Air Lift)
Fuller Company

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
Allen-Sherman Hoff Co.
The Dorr Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allen-Sherman Hoff Co.
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Dredging)
Allen-Sherman Hoff Co.
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Morris Machine Works
A. R. Wilfley & Sons

Racks or Decks for Lift Trucks
Besser Mfg. Co.

Railways (Electric)
General Electric Co.

Railway Equipment
General Electric Co.

Ready Mixed Concrete Plants
Blaw-Knox Co.
Jaeger Machine Co.

Ready Mixed Concrete (Truck Mixer Bodies)
Blaw-Knox Co.
Jaeger Machine Co.

Reciprocator Feeder for Unloading Hopper Bottom Cars
Besser Mfg. Co.

Recuperators
Manitowoc Engineering Works

Reinforcement Fabric (Concrete)
Wickwire Spencer Steel Co.

Repair Shop Service
Cement Mill Equipment Co.

Road Machinery
Austin-Western Road Machinery Co.
Barber-Greene Company
Blaw-Knox Co.
Harnischfeger Co.
Koehring Co.
Northwest Engineering Co.

Rock Bits (See Drill Bits)

Rock Drills (See Drills, Rock)

Rod Mills
Hardinge Co., Inc.

Rods (Wire)
Wickwire Spencer Steel Co.

Roller Bearings
Timken Roller Bearing Co.

Roofing (Ready to Lay)
Texas Company

Rope, Wire (See Wire Rope)

Rotary Screens (Sections and Segments)
Hendrick Mfg. Co.

Rubber Covered Screens
B. F. Goodrich Co.

Rubber Molded Goods
Hewitt Rubber Corp.
Manhattan Rubber Company

Sack Balers
Besser Mfg. Co.

Sand and Gravel Screening and Washing Equipment
Universal Road Machinery

Sand Drag
Smith Engineering Works

Sand Settling Tanks
Jeffrey Mfg. Co.
Link-Belt Co.
Smith Engineering Works

Scales (Automatic Proportioning)
Merrick Scale Co.
Richardson Scale Co.

Scales (Cement)
Merrick Scale Co.
Richardson Scale Co.

Scrapers (Power Drag)
Blaw-Knox Co.
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros., Inc.

Screens
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
The C. O. Bartlett & Snow Co.
Besser Mfg. Co.
Carnegie-Illinois Steel Corp.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Diamond Iron Works
Hardinge Co., Inc.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
New Holland Machine Co.
Nordberg Mfg. Co
Productive Equipment Corp.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Simplicity Engineering Co.
Smith Engineering Works
Sturtevant Mill Co.
Universal Road Machinery
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Geo. Haiss Mfg. Co., Inc.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Perforated
Hendrick Mfg. Co.

Screens (Testing)
Hendrick Mfg. Co.

Screens (Vibrating)
Diamond Iron Works
Good Roads Machinery Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co
Robins Conveying Belt Co.
Simplicity Engineering Co.
Smith Engineering Works
Sturtevant Mill Co.
W. S. Tyler Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screens (Woven Wire)
Wickwire Spencer Steel Co.

Screw Conveyors
Besser Mfg. Co.
Cement Mill Equipment Co.

Screw Rewasher (Single and Twin)
Smith Engineering Works

Screws (Cap, Self Locking, Set, Hollow Set)
Standard Pressed Steel Co.

Scrubbers, Washers
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Hardinge Company, Inc.
Lewistown Fdy. & Mach. Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.

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Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Separators (Slurry)
F. L. Smidth & Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
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Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Co.
Manitowoc Engineering Works
Northwest Engineering Co. (Crawling Tractor)

Silos
Chicago Bridge & Iron Company
F. L. Smidth & Co.

Skip Hoists and Skips
Diamond Iron Works
Link-Belt Co.

Slings (Wire Rope)
American Cable Co., Inc.
American Steel & Wire Company
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Smokestacks
Chicago Bridge & Iron Company

Sockets (Wire Rope)
American Steel & Wire Company

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Speed Reducers
Cement Mill Equipment Co.
Huron Industries, Inc.
Link-Belt Co.

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Chain Belt Co.
Diamond Iron Works
Jeffrey Mfg. Co.

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Joseph T. Ryerson & Son, Inc.

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Timken Roller Bearing Co.

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Chicago Steel Foundry Co.
Timken Roller Bearing Co.

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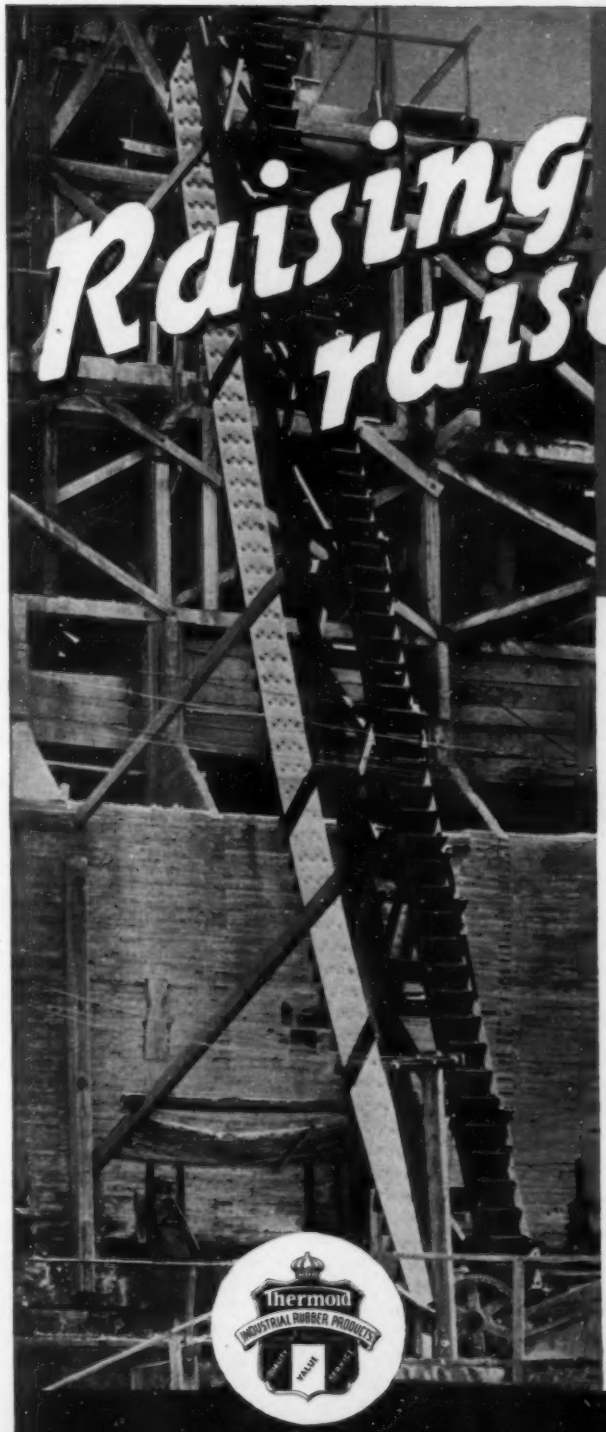

Raising Rock raises "Cain"

WITH BUCKET ELEVATOR BELTING

And Thermoid knows where the "Cain" (or strain) tells first. Thermoid engineers have stumbled over their own air drill hose and dodged many a shower of blasted rock to *get the facts*—to see the job this belting is expected to do.

Whether the load is dust or crushed rock, there is a Thermoid Bucket Elevator Belting built for the job. That's because our engineers and laboratory men have developed (1) a special silver duck that can withstand the strain of bucket *plus load* right at the bolt holes; (2) a fabric that gives maximum resistance to sudden surging loads; (3) a carefully compounded and tested rubber impregnation and cushion between plies that can stand up under the severest service conditions.

Thermoid Bucket Elevator Belting proves its superiority in the way that counts most—by delivering the lowest cost per foot per service hour.

Thermoid

THERMOID RUBBER
Division of Thermoid Company
TRENTON, NEW JERSEY

BELTING · HOSE · PACKINGS · BRAKE LININGS

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Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Steels, Drill (See Drill Steel)

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Chicago Bridge & Iron Company

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Storage Equipment
Fred T. Kern Company

Strippers
Besser Mfg. Co.

Structural Steel
Cement Mill Equipment Co.

Stucco Materials
Geo. S. Mepham Corp.

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Chicago Bridge & Iron Company
Combustion Engineering Corp.
The Dorr Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Thickeners
The Dorr Co.
Hardinge Co., Inc.

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Besser Mfg. Co.

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B. F. Goodrich Co.

Tools (Pneumatic)
Ingersoll-Rand Co.

Torches
Cement Mill Equipment Co.

Track Equipment
Carnegie-Illinois Steel Corp.
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Tractors
Koehring Co.

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Athey Truss Wheel Co.

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American Steel & Wire Company
Broderick & Bascom Rope Co. (Yellow Strand)
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Timken Roller Bearing Co.

Trenchers
Barber-Greene Company

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Athey Truss Wheel Co.

Truck Bodies (Ready Mixed Concrete)
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Jaeger Machine Co.

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Blaw-Knox Co.
Jaeger Machine Co.

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Tube Mill Liners (See Mill Liners)

Tubing (Blasting)
B. F. Goodrich Co.
Manhattan Rubber Company

Tubing (Seamless Steel)
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Gruendler Crusher & Pulv. Co.
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American Steel & Wire Company
Broderick & Bascom Rope Co. (Yellow Strand)
Hazard Wire Rope Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Wickwire Spencer Steel Co.
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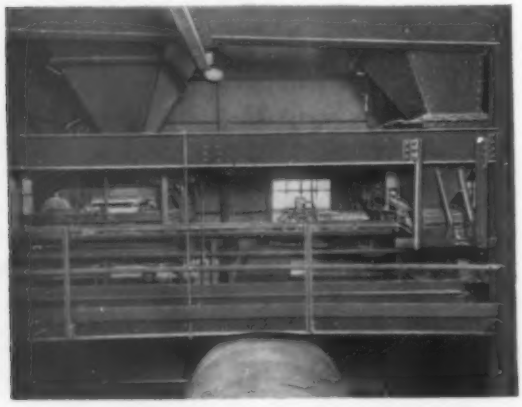
ACCURATE WEIGHT: is an economy—your ingredients for the raw or finished mixes can only be truly and exactly proportioned by WEIGHT. This prevents spoiled mixtures, avoids remilling, and saves the Cement Mill real money.



MAINTENANCE—Here is another way where Richardson Scales are a true economy, for they are built sturdily to withstand many years of heavy-duty service and will operate year after year with practically no maintenance expense.

WIDE RANGE—Richardson CONVEY-o-WEIGHS are built to meet the needs of the Cement Mill and are provided with wide range in capacity. One machine supplied for weighing 10 to 100 lbs. of gypsum; another 42 to 750 lbs. limestone. Built to meet individual needs.

For blending and mixing, two or more scales are electrically interlocked to discharge in unison, or deliver weighed charges at predetermined intervals.

ACCURATE • DEPENDABLE • ECONOMICAL

RICHARDSON SCALE COMPANY CLIFTON, NEW JERSEY

NEW YORK ATLANTA BOSTON PHILADELPHIA BUFFALO COLUMBUS
CHICAGO OMAHA WICHITA MINNEAPOLIS SAN FRANCISCO

Cement Clinker Cuts like Emery... But CABLE Not Worn At All

Thus writes William Fowden, *plant manager of The South Dakota Cement Plant, Rapid City, S. D.*

Part of Mr. Fowden's letter is as follows:

"... *and I am more than satisfied with the cable we are using on our electric shovels and electric yard crane. It is pulled around in a pile of cement clinkers which has almost the cutting properties of emery. As yet we have not had any trouble with the cable, and cannot see that it has worn at all.*"

A visitor closely examines the G-E Type W three-conductor tellurium-rubber cable, in use at the South Dakota Cement Plant, and can find no signs of wear

Four Years' Service

This cable is a G-E tellurium-cured all-rubber type, three-conductor, No. 2 Awg.

It was installed in January, 1932, and when a G-E representative examined it on October, 16, 1936 he found little signs of wear, despite this nearly four years of hard service. It was once run over by a 75-ton steam locomotive, and the jacket was somewhat damaged, but a simple jacket repair put it back in service.

Tellurium-cured

The jacket on this G-E portable cable is cured or vulcanized by a special G-E process, using the element tellurium. The process results in a protective covering that is not only tough and capable of resisting abrasion, but which is also long aging and able to withstand the rays of the sun.

A Type for Every Use

You can get this G-E portable cable in every type and size, one of which is best suited for a coal-cutting, loading, or conveying machine—for an electric shovel, crane, hoist, or dredge—for a portable motor or compressor—for an arc-welding machine—in fact, for every kind of portable electric equipment.

May we send you a copy of our Bulletins GEA-1728 and GEA-1918, which give prices and specifications? Address nearest G-E sales office, or General Electric, Dept. 6E-201, Schenectady, N. Y. 520-107

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Here's your answer

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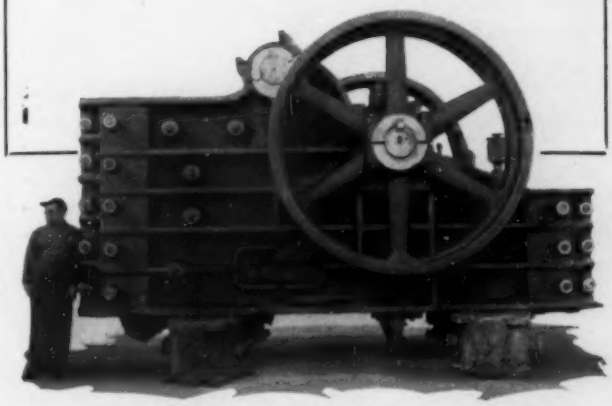
Write us regarding any crushing requirement, no matter how large or how small. Our engineers welcome the opportunity of working out the most efficient and economical answer to your problem.

Our Bulletin No. 110 contains much information which is invaluable to every crusher operator. Send for your copy today.



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Detachable buckets are spotted at points of loading and filled while previously filled buckets are being hauled to destination.

Loaded buckets are picked up after empty buckets are respotted. It is all very simple.

SAVE · TIME ↓

No heavy costly equipment to eat into profits—no delay — no high upkeep cost—no disappointments.

A hoisting device raises bucket to desired height — can be installed on your present trucks if desired or any other.

It's the modern, easy, speedy, economical and efficient way of hauling material more profitably. Low initial investment.

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AGRICULTURAL LIMESTONE,
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FIRE CLAY or any
DRY, NON-METALLIC STONE

The BRADLEY 3-ROLL MILL

An inexpensive machine, distinguished for its low power consumption and low maintenance costs—for

FINE OR SEMI-FINE GRINDING
Without Auxiliary Equipment

POSITIVE CONTROL GUARANTEES
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Our line includes PULVERIZERS with capacities from 1 to 40 Tons per hour. Finenesses—20 to 350 Mesh.

BRADLEY PULVERIZERS are operating economically and efficiently to the complete satisfaction of many of the leading manufacturers of AGRICULTURAL LIMESTONE.

AIR SEPARATORS BUILT IN A WIDE RANGE OF SIZES TO MEET EVERY DEMAND

BRADLEY PULVERIZER CO.

ALLENTOWN, PA.

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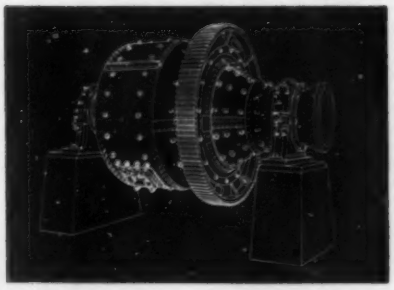
MORE money saved because Hardinge Conical Mills hold the *lowest maintenance cost records* among all pulverizers! Their uniform quality and smooth running take "grief" away, and their performance is backed up by volumes of data such as:



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Grinding limestone—Ball consumption 0.025 lbs. per ton
Liner life . . . . . 12 years

Grinding clinker —Ball consumption 0.097 lbs. per bbl.
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Liner life . . . . . 15 years

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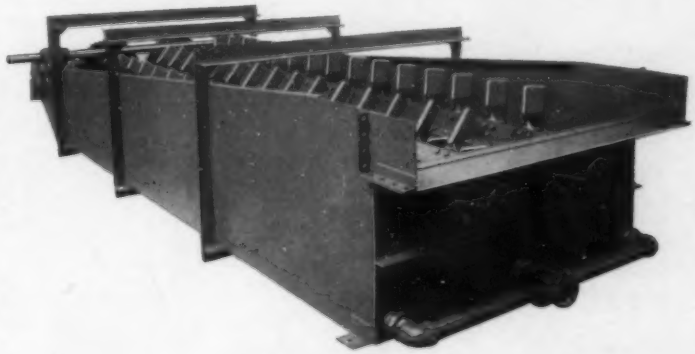
In no other washer can all these features be found . . . . . .

RUGGEDNESS, dependability, efficiency and ability to handle large production at lowest cost.



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These paddle type machines subject the material to the same washing action which has proved so successful in our screw type.

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EAGLE IRON WORKS

DES MOINES, IOWA

Ty-Rod

High-Capacity Screen

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FOR *damp, sticky material*

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WOVEN WIRE SCREENS, SCREENING
DRYING and SCRUBBING MACHINERY

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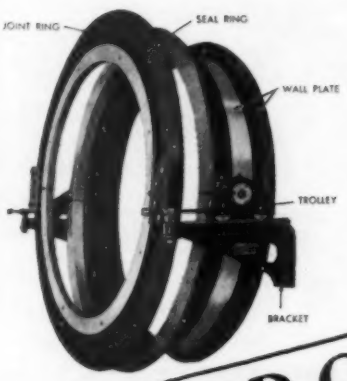

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LIMA, OHIO
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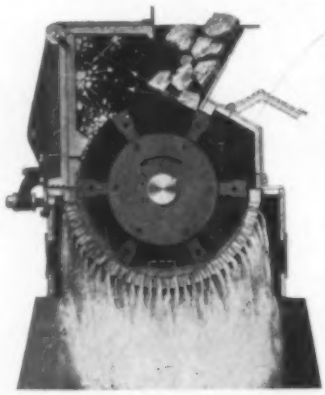

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CRUSHERS AND PULVERIZERS

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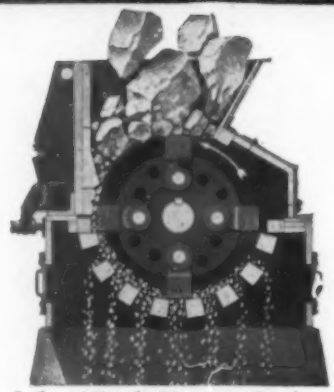
Jeffrey swing hammer crushers and pulverizers will give you the most cubical product and sharpest corners for making the best bond with cement. They are equally efficient in the reduction of limestone, shale, clay, chalk, marl, gypsum, phosphate rock, asbestos rock and many other products in the stone products field.

Jeffrey equipment and plant engineering cover the entire stone products industry.

Send for Catalog No. 550-H.

The Jeffrey Manufacturing Co.
935-99 N. Fourth St., Columbus, Ohio



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PRODUCE HIGH EARLY STRENGTH

Normal, all-purpose, masonry, plastering and stuccoing cements under the several BLANK patented processes.

Inquiries invited from producers of cement, lime and allied products.

Patents issued and pending in the United States, Canada, and in leading Central and South American and European Countries.

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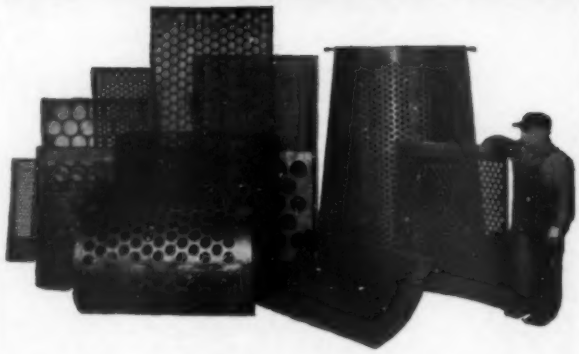

For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

The Harrington & King Perforating Co.

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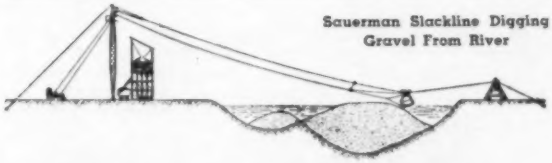


Sauerman Slackline Digging Gravel From River

DIG and HAUL . . .
for a few cents per cubic yard

The first cost of a Sauerman Slackline or Drag Scraper machine for the average long haul job is less than the cost of any other equipment that will *dig, haul* and *place* an equal yardage of materials. Moreover, a Sauerman machine is easy to operate and demands little by way of repairs, assuring a minimum daily expense.

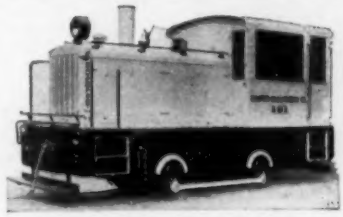
Whether your problem is to dig gravel from a deep pit, high bank or river, or to convey loose rock from quarry to crusher, or to stockpile and reclaim surplus products—there is a type and size of Sauerman machine to meet your needs. Give us a description of your problem and we will offer our suggestions on equipment for your consideration. Catalog illustrating several hundred typical installations mailed free on request.

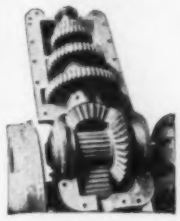
SAUERMAN BROS.

430 S. Clinton St.
CHICAGO

Drag Scraper Mining High Hill of Gravel

STRENGTH IN THE VITAL PARTS





Pat. Pending

Davenport transmissions are marvels of ruggedness and of permanently smooth performance. They meet the demands of the toughest service and smilingly ask for more.

Because of their ability to deliver the lowest cost ton-miles through unfailing dependability during more years of hard, constant performance, Davenport Locomotives are winning increasing favor among pit and quarry operators.

We urge engineers and executives to study the reserve capacity of Davenport Locomotives for withstanding the shocks and strains of service. Every part is capable of safely meeting maximum service demands and combines with every other part for that smooth, money saving operation which spells long run Satisfaction. Davenport Locomotive Works, Davenport, Iowa.

NEW YORK AND EXPORT OFFICE
30 Church St. Cable Address "Brosites"

Descriptive data, engineering consultation and recommendations FREE on request.

DAVENPORT — Solid as the Rock of Ages — INDUSTRIAL LOCOMOTIVES

DAVENPORT LOCOMOTIVE WORKS

A DIVISION OF THE DAVENPORT BESLER CORPORATION

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.

ASK FOR *These* NEW CATALOGS

Here are three brand new P&H Pacemakers, stronger, faster, easier to operate—to cut your dirt-moving costs.

P&H Model 855—2 Yd.
P&H Model 955—2½ Yd.
P&H Model 955LC—2½ Yd. Long Range Dragline.

Write for bulletin on the size you need. Address the Harnischfeger Corporation.
4465 West National Avenue,
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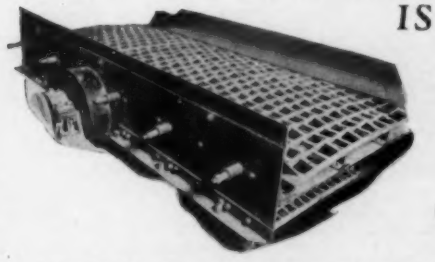
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

VIBRATING SCREEN SERVICE IS TOUGH



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Hendrick Plate *can take it*

Hendrick Perforated Plate has been proved in service on vibrating screens throughout the country. It comes flat or corrugated. It is furnished, according to your needs, with any desired size or shape of perforation. It is available in high-carbon, heat-treated steel or abrasive-resisting steel to suit your screening conditions.

Whatever the specifications, you'll always find it produced according to the Hendrick standard . . . a tough plate for a tough service. This time try Hendrick.

HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

SALES OFFICES IN PRINCIPAL CITIES
PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.

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CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT FOR SALE

CONSOLIDATED GOOD USED EQUIPMENT

4—4'x8' Allis-Chalmers Screens, 2-deck, Texrope drive.
2—3'x6' Niagara Screens, 2-deck Texrope drive.
2—12x36", 3'x5' Jigger Screens, 2-deck.
1—4'x12' Telsmith, 1-deck, with motor.
8—Tyler Hummer Screens, 3x5', 4x5', 4x7'; types 31, 37, 39, 33, 60.
2—Tyler V-32 Vibrators.
2—3'x6', 4'x5' Sturtevant M. V. Screens, 2-deck.

1—24"x36" Allis-Chalmers Jaw Crusher.
1—42"x48" Traylor UNUSED Jaw Crusher.
1—30"x42" Buchanan, Type C, sectional.
1—42"x60" Bacon Farrel Crusher.

4—6" & 10" Allis-Chalmers McCully Crushers.
3—20", 36" Allis-Chalmers Superior McCully Crushers
1—18x16" Pennsylvania Single Roll Crusher.
1—24x24" Jeffrey Single Roll Crusher.
3—30x16", 20x14" Sturtevant Crushing Rolls.
5—Sturtevant Rotary Fine Crushers; Nos. 0, 1, 1½, 2.

3—Raymond Roller Mills, 3 and 5-roll, high side; 5-roll low side.
4—Raymond Pulverizers; No. 0000, No. 00, No. 1, No. 3.
5—Raymond Imp Mills; No. 3, 32, 45, 50, 55.
3—3', 5', 10' Sturtevant Air Separators.
2—36" Gayco Air Separators.
8—Hardinge Iron Lined Ball Mills; 3'x8", 4½'x16", 6'x22", 8'x22", 8'x30".
1—6'x22" Hardinge Silex Lined Pebble Mill; also 8'x30" and 8'x72" unlined mills.
1—7'6"x5' Unlined Pebble Mill.
1—No. 32 Marcy Ball Mill.
2—6'x12' Hardinge Iron Lined Rod Mills.
4—5'x26', 6'x35', 6'x45' Class "A" Double Shell Ruggles-Coles Direct Heat Rotary Dryers.
10—Direct Heat Rotary Dryers; 3x30', 4x30', 5x50', 6x45', 6x50', 6x60', 8x60'.
8—Rotary Kilns; 6x60', 8x110', 8x125', 8'6" & 9'6"x150'.

Just a partial list.
WE WILL BUY A SINGLE MACHINE OR COMPLETE PLANT.
What do you wish to sell? Send us details.

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row **New York, N. Y.**
Plant and Shops at Newark, N. J., cover 8 acres of ground.

STOP!
Check Our Listing Before You Buy

AIR COMPRESSORS
3—110 cu. ft. Metalweld or I. R.
3—220 cu. ft. Chicago Pneumatic.

BINS:
1—Blaw-Knox 72-ton, cap. 2 compt. portable self-cleaning steel material bin.

CRANES:
1—1-yd. Osgood Heavy Duty full revolve 50' boom, 10-ton cap.
1—1-yd. Byers Heavy Duty Standard, full revolv., completely rebuilt.

HOISTS:
1—Lidgerwood 40-45 H. P. "Super Utility" double drum, gear drive. Waukesha Engine.
1—Lidgerwood 20 H. P. single drum, gear drive, LeRoi Engine.

PILE HAMMERS
2—McK. Terry No. 5 1500 lbs.
1—No. 3 Union 4500 lb. 2 driv. heads
1—No. 9B2 McK. Terry flat anvil base 6800 lb.

PNEUMATIC DRILL SHARPENERS
3—Ingersoll Rand No. 33 and 34.

Write for latest complete stock list of Rebuilt Equipment.

RENTAL SERVICE CO., INC.
2017 W. Venango St.
PHILADELPHIA, PA.

CENTRIFUGAL PUMPS

2500 GPM DeLaval Type 10, 159', 75 lbs., 10" S. Stage D. Suction, Dir. conn. to 150 HP AC motor.

3500 GPM DeLaval Type 150 MP 10" 130.5" Head coupled to 150 HP AC motor.

A. C. Motors
3 Ph. 60 Cy.

H.P.	Make	Type	Volts	Speed
1500	G. E.	Synch.	440/220	180
500	G. E.	Synch.	440	1200
450	West.	Synch.	440	257
450	West.	S1. Rg.	2300	875/700
400	G. E.	S1. Rg.	2300/550	390
400	West.	S1. Rg.	2300/550	290
400	G. E.	S1. Rg.	440/220	505
400	West.	S1. Rg.	2300	514
350	Cr. Wh.	Synch.	2300	720
300	G. E.	Synch.	2300	600
300	A1. Ch.	S1. Rg.	2300/550	585
250	G. E.	S1. Rg.	4000/2300	257
250	West.	S1. Rg.	440/220	585
250	F. Morse	S1. Rg.	2300/550	1200
225	El. Machy.	Synch.	4150/2300	450
220	G. E.	Synch.	2300	900
200	West.	Synch.	440	514
200	West.	Synch.	2300/550	1800
200	West.	S1. Rg.	2300	870
200	West.	S1. Rg.	440/220	900
150	West.	Synch.	4000/2300	1800

BELYEA COMPANY, INC.
141 W. 18th St. **NEW YORK, N. Y.**

FOR SALE

72 Ton American six wheel switching locomotive with separate tender, 20x26" cylinders.
63 Ton Porter six wheel switching locomotive with separate tender, 19x26" cylinders, Walschaert valve gear.
53 Ton Baldwin six wheel switching locomotive with separate tender, 18x24" cylinders, built 1925.
50 Ton Baldwin six wheel switching locomotive with separate tender, 17x24" cylinders, built 1922. (Six duplicates.)
35 Ton Baldwin four wheel switching locomotive with separate tender, 15x24" cylinders, built 1921.
21 Ton Vulcan four wheel saddle tank locomotive, 11x16" cylinders, built 1923, 36" gauge. (Three duplicates.)
Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham, Alabama

NOTE: Sensational Prices for Quick Sale

Diesel Oil Engines, from 10 to 1000 HP. at a price you can afford.
Fairbanks-Morse Oil Engines, any size.
Stone Quarry Machinery, Contractors' Eqpt. At bargain prices.

J. D. ANDERSON MACHINERY CO.
5518 Maple Ave. **St. Louis, Mo.**

Good Equipment—Priced Right

1—Northwest No. 7 gas crane, 1¾-yd. cap., 70' boom.
1—Osgood comb. crane and shovel, gas, 1¾-yd. cap.
2—Brown Hoist gas cranes, 10-ton cap.
1—Osgood steam shovel, 1¾-yd. cap., code boiler.
1—Browning truck crane.
2—Locos., gas, 20-ton cap., 36" ga. Whitcomb.
1—Loco., gas, 20-ton cap., 36" ga. Vulcan.
25—Dump cars, 4-5 yds., two-way 36" ga.
10—Dump cars, steel V-type, 3 yds., 36" ga.
1—Butler batcher plant, 3 compts., 125 yds. bin, weigh meters, cement bin, screw conveyor, compl.
1—Tractor Diesel 75 Caterpillar, scraper & bulldozer.
1—Tractor Diesel McCormick Deering 40 with bulldozer.
1—Case Tractor, wheeled with boom, 4-ton cap.
1—Air Compressor I. R., 14"x12" ER-1, elec., 528'.
1—Sullivan Class WN3, air comp. 868 cu. ft., elec. motor.
1—Worthington duplex air compressor, 1050 cu. ft. electric.
Conveyor Belt, 30", 7-ply, NEW, 2000 ft.
1—Conveyor Belt, 20", 5-ply, 200 ft.
1—Portable Belt Conveyor, electric, 14"x20'.
1—Bucket Elevator, 32' centers, comp. in all respects.
50—Rock Drills, DCR-23, X59, X49, 870, others.
10—Concrete Breakers.
30—"BARRE" Carving Tools, Types BL, CL, DL.
1—Steel Storage Bin, 4 compts., 500-yd. cap.
1—Sauerman gas driven double drum Dragline Hoist, 75 h.p.
1—Clyde 3-drum, attached swinger Electric Hoist, 75 h.p.
1—Ingersoll-Rand No. 50 Leyner Drill Sharpener.
2—Steel Stiff Leg Derricks, 100' booms, 15-ton cap.
1—Sand Pump, Gould, 8", belt driven.
1—Hoist, steam double drum, 8¼"x10", all code boiler.
2—Hoists, steam double drums, 7"x10", all code boilers.

RICHARD P. WALSH CO.
30 Church St. **NEW YORK CITY**

Jaw Crushers—4"x8" up to 66"x84".
Crushing Rolls—16"x10" up to 54"x24"—Gyratory Crushers—No. 3 up to 42".
Ring Roll Mills — No. 1½ and No. 1 — Swing Hammer Mills.
Rotary Fine Crushers—No. 1, No. 0, No. 00.
Direct Heat Rotary Dryers—4'x30', 5'x50', 5½'x35', 6'x60', 3½'x25', 8'x50'.
Semi-indirect Heat Dryers, 4'x30', 4½'x26', 5'x30' and 8½'x75'.
Cement Kilns—3' up to 9½' diameter.
Hardinge—Marcy & Fuller—Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 5 roll.
1—New 60x84 Jaw Crusher.
Tube—Rod and Ball Mills—4' to 8' diameter.
1—6'x22" Hardinge ball mill.
New dryers made for all purposes.
5' & 30" air separators—Vibrating screens.
2—No. 7 Kent ring roll mills.

W. P. HEINEKEN
93 Liberty St., N. Y. **Tel.: Barclay 7-7298**

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20-TON WHITCOMB GASOLINE LOCOMOTIVE

36" gauge completely overhauled. Large supply of spare parts. Priced for quick sale.

United Commercial Co., Inc.
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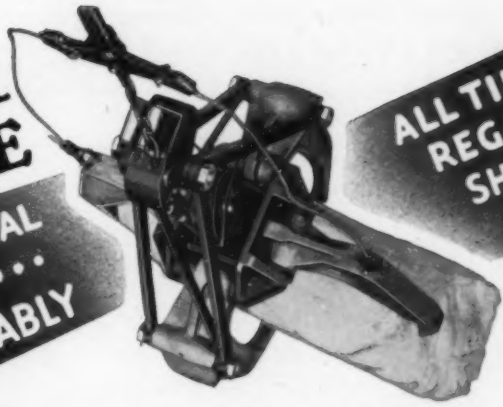
this Owen GRAPPLE

HANDLES MATERIAL ...MORE..... PROFITABLY



ALL TINES GRIP REGARDLESS OF THE SHAPE OF THE ROCK TO BE HANDLED

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CLEVELAND, OHIO
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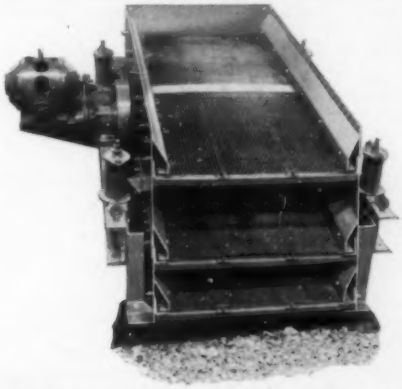


A SCREEN WITH NO "DEAD SPOTS"!
made by

GoodRoads MACHINERY

producers of
CHAMPION AND CLIMAX ROCK CRUSHERS
ELEVATORS CONVEYORS
REVOLVING SCREENS
WASHERS FEEDERS

GOOD ROADS MACHINERY CORP.
KENNETT SQUARE, PA.

LINK-BELT
VIBRATING
SCREEN

For Accurate Screening and Sizing

● All materials, fine or coarse, light or heavy... clay, gravel, sand, ores, crushed stone, coal, coke, fertilizer, grain, sugar, chemicals, pulpwood chips, etc. . . . yield to the wizardry of the mechanically-vibrated Link-Belt Vibrating Screen, and classify themselves in strict accordance with their size. Its uniform vibration keeps the meshes open, and makes the screen's entire screening surface 100% effective. Send for Book No. 1562.

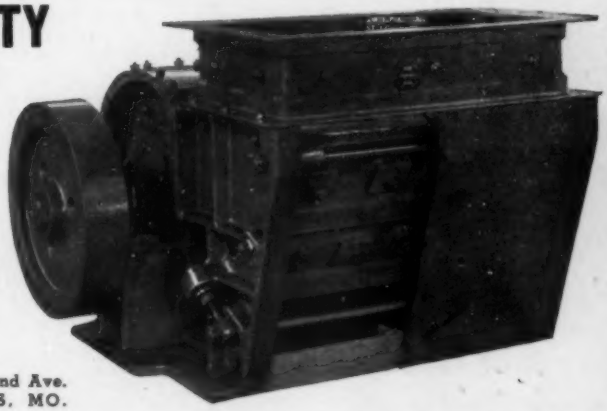
Address Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, Toronto, or any of our offices located in principal cities.

1905

BUILT-IN DEPENDABILITY

Every part used in an AMERICAN CRUSHER is carefully selected and tested to assure long, hard service free from trouble. . . .

SKF Spherical Roller Bearings, Cast Steel Adjustable Platen and Manganese Line Crushing Chamber. As a result, long life, low power, and minimum upkeep cost characterize all AMERICAN CRUSHERS. Then, too, a more uniform product is assured with minimum fines and no slivers or chips. Write for complete catalog today.



American Pulverizer Co., 1245 Macklind Ave. ST. LOUIS, MO.

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For Sale *Following equipment at bargain prices:*

2—No. 66 Smidth Kominuters.
1—42" Fuller-Lehigh Mill; Shop No. 2123.
1—Gates type Allis-Chalmers Gyratory crusher No. 8; Shop No 6431.
1—Simonds Disc crusher, type B, 36", Shop No. 154.
1—6'x60' Cooler or Dryer. Channel flights.
1—6'x50' Cooler or Dryer.
1—500 HP Freeman Bonus Water Tube Boiler. 217—4" tubes 20' long. Tubes in excellent condition.
1—4'x8' Traylor large size Sheridan Shaking Grizzley. Never used.
1—Deane Jet Steam Condenser. No. 57340. Size 12"x22"x24".
2—Deane Steam Pumps, size 7½"x 8½"x6". Serial Nos. 81900 and 62325.
1—Type B Jeffrey Hammer Mill, 24"x36".
2—Type A Jeffrey Hammer Mills, 24"x18".
1—Fay & Egan Band Saw No. 192.
1—No. 62 Universal Wood Worker; complete with all accessories.
Several hundred pulleys of various sizes.

WriteP. O. Box 3046, Houston, Texas.

An Unusual Offering

6½ Yd. MINING or STRIPPING SHOVEL

Bucyrus 320-B 2200/4000 volt 3 ph. 60 cycle, A.C.-250 volt D.C. Ward-Leonard control. 90 ft. boom and 58 ft. dipper stick. Built 1925 and used only two years. Very good condition.

Located Near Madisonville, Ky., Part Cash Terms if Necessary

IRON AND STEEL PRODUCTS, INC.
Railway Exchange, Chicago, Ill.
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"Anything so long as it contains IRON OR STEEL"

DO YOU NEED ELECTRICAL EQUIPMENT

10,000 items to choose from. Motors, Generators, Switches, Meters, Fans, Transformers, etc.

Priced to Sell.

Wire—Write—Phone

ERIE ELECTRIC MOTOR REPAIR CO.
Inc.
120 Church St.
BUFFALO, N. Y.

SPECIAL!

500 ALL-STEEL 50-TON BATTLESHIP HOPPER CARS

25—40 ton steel u/f flats.
20—50 ton steel u/f flats.
50—30 ton steel u/flats.
200—30 ton steel u/f box cars.
75—30 ton steel u/f stock cars.
75—50 ton all-steel gons.

Locomotive Cranes

1—15-20 ton Link-Belt. 50 ft. boom.
1—20 ton Ohio. 50 ft. boom.
1—20 ton Browning No. 8. 50 ft. boom.
1—30 ton Ohio. 50 ft. boom.
1—40 ton Brownhoist. 60 ft. boom.
1—50 ton Wrecker type crane. 50 ft. and 90 ft. booms.

Saddle Tank Locomotives

1—25 ton Baldwin. Std. Ga.
1—32 ton American. Std. Ga.
1—40 ton Baldwin. Std. Ga.
1—40 ton geared Heisler. Std. Ga.
3—Vulcan, 13x20 yds. Std. Ga.
1—18 ton gas-electric. Std. Ga.

Narrow Gauge Dump Cars & Locomotives. Standard Gauge Dump Cars & Switch Engines

RAILS

Complete Stocks Carried at Principal Points Throughout the Country

HYMAN-MICHAELS COMPANY
122 SO. MICHIGAN AVE. CHICAGO, ILL.
ST. LOUIS • NEW YORK • SAN FRANCISCO • SEATTLE

N. Y. AND PITTSBURGH STOCK

1—1300 ft. Ingersoll-Rand Air Compressor PRE-2, 3 ph., 60 c., 220 v., synchronous motor direct connected. Belt driven exciter.
1—660 ft. Worthington 2 stage Electric Air Compressor.
2—500 ft. Worthington Steam Air Compressors.
½ Yd. P. & H. Caterpillar Dragline.
3—No. 50 Ingersoll-Rand Drill Sharpeners.
16—Steam Hoists, 6x8 to 10x12.
12—Electric Centrifugal Pumps, 2 to 8 inch.
6—High Head Gasoline Pumps.
½ yd., ¾ yd., 1 yd., 1¼ and 1½ yd. Hayward & Williams Clamshell Buckets.
3—Ingersoll-Rand Aftercoolers.
10 Ton Erie 40' boom Steam Cat. Crane.
150 H.P. Hall-Scott Gasoline Engine.
5—Steam Engines 10 to 70 H.P.
2—37H.P. American Elec. 2 Drum Hoists with attached swingers.
1—No. 49 Kennedy Gyratory Crusher.
1—10x20 Climax Jaw Crusher.
¼, ½, ¾ and 1 yd. Concrete Mixers.
7—Steam Derrick Swinging Engines.
3—1½ KW. Moon Turbine Light Plants.
2—300 H.P. DeLaVergne Diesel Engines.
1—100 H.P. DeLaVergne Diesel Engine.

COAST-TO-COAST EQUIP. CORP.
101 W. 31st Street New York, N. Y.

DEPENDABLE EQUIPMENT

1—3-Drum **Thomas Elec. Hoist** with boom swinger
1—75-B, 1½-yd. **Gas Shovel**
1—75-B, 1¼-yd. **Gas Shovel**—Dragline 55' boom, 1-yd. bucket
1—104 **Northwest Crane**—50' boom
1—50-B **Bucyrus Deisel Dragline**
1—50-B **Bucyrus Steam Shovel**
1—50-B **Bucyrus Steam Crane**
1—21-ton, 11x16, Std. Ga. **Davenport Loco.**
6—21-ton, 11x16, Std. Ga. **Vulcan Loco.**
2—25-ton, 12x16, Std. Ga. **Davenport Loco.**
1—28-ton, 12x18, Std. Ga. **Vulcan Steam Loco.**
2—38-ton, 14x22, Std. Ga. **American Steam Loco.**
4—50-ton, 17x24, **Davenport, 6-wheel Switchers**
2—No. 8-C **Browning Steam Locomotive Cranes**
12-yd., 16-yd., 20-yd., 30-yd. standard gauge **Dump Cars**
General Construction Equipment

CLAPP, RILEY & HALL EQUIPMENT CO.
14 North Clinton St., Chicago, Illinois

ELECTRICAL MACHINERY

Motors and Generators. A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.,
Fort Wayne, Indiana

REAL BARGAINS

¾, ⅞, 1, 1¼ and 1 yard Gasoline & Steam Shovels.
4, 6 and 8 yard Electric Shovels.
3 yard Monighan & Bucyrus Draglines.
6 yard Monighan Diesel-Electric Dragline, 150' boom.
Steam, Gasoline, Belted & Diesel Hoists.
Gyratory Crushers Nos. 5, 6 and 8K.
Jaw Crushers 7x12 to 60x84".
Roll Crushers 18x18 to 32x48". 4' Symons Cone.
Rotary Dryers, 5'x32', 6'x50' and others.
20 ton American Guy Derricks, also stiff leg Derricks.
36" Gauge Steam Locomotives 9 to 32 tons.
Standard Ga. Steam Locomotives 25 to 75 tons.
New 60 HP Diesel Hoist, drum 48x45".
Gasoline Locomotives 3 to 25 tons, various gauges.
Clamshell Buckets, Owens ½, ¾, 1½, 2 and 2½ yard.
Page Dragline Buckets ¾ and 1½ yard.
10" Sand Pumps, Manganese lined.
Diesel Engines 10 to 600 HP. with and without Generators. Natural Gas Engines.
Let me have your inquiries also list of surplus items for sale. Ask for Bulletin 33

MID-CONTINENT EQUIPMENT CO.
710 Eastgate St. Louis, Mo.

FOR SALE

3—Single deck Vibrating Screens, 4x8.
1—Climax, Mod. R6U, 6-cyl., 142 H.P. at 1200 r.p.m. Power Unit, complete.
1—Thomas, 2-drum, 55 H.P. Electric Hoist.
5—Sets of head and tail pulleys with drives, etc., for 24" and 30" belts.

P. A. HENAULT
2140 Book Bldg. Detroit, Mich.

FOR SALE

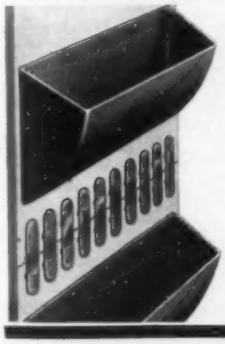
¾ Yard Sauerman Bucket-carrier.
75-ft. mast with cables.
Mundy Hoist with electric motor.
2 Sand settling tanks, etc.
Will sell all or part.

NEWARK SAND & GRAVEL CO.
W. Main St. & Terrace Ave. Newark, Ohio
Tel.: 2700

THESE columns offer you the best medium in the rock products industry for the sale, exchange and purchase of used equipment, rock, quarry and gravel-pit property; the circulation and buying influence of Rock Products extends beyond those now actually engaged in operating plants; it includes mining engineers and capitalists who may be reached through no other medium because of Rock Products' world-wide reputation as the **business journal** of the rock products industry.

•A Tight Butt Joint•

for long life of Conveyor and Elevator Belts



Note how recessed plates compress belt end. Internal friction and ply separation in belt ends is overcome. The tight butt of the belt ends prevents passage of materials or liquids through the belt. Made in steel, "Monel Metal," non-magnetic and abrasion resisting alloys. Five sizes. Sold by jobbers and belting houses. Consultation regarding belt joining invited.

Sole Manufacturers
FLEXIBLE STEEL LACING CO.
4684 Lexington Street, Chicago
In England at 185 Finsbury Pavement, London, E. C. 2

NOW - *MORE THAN EVER BEFORE . . . . .*

Increased business volume with its correspondingly increased competition forces operators to demand the ultimate in dependability in their equipment.

Fourteen years of service to the material aggregates industry results in Simplicity Screens having BUILT IN SUPERIORITY.

Simplicity Screens will make larger tonnages with higher efficiency than any screen of comparable size.

Write us today and let us prove it.

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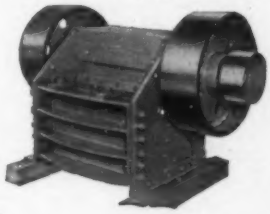
CRUSHERS and PULVERIZERS



The old reliable result-producers known the world over for their truly remarkable performance under the most exacting service conditions.

Gruendler crushers and pulverizers prepare rock for cement mills or aggregate at extremely low cost per ton. Capacities from 10 tons to 4000 tons daily. All steel construction — low upkeep cost.

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Equipment for Both Fixed and Roadside Plants.

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Since 1885
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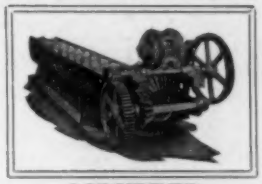
Why ship dirty stone when it can be made clean easily and so economically?



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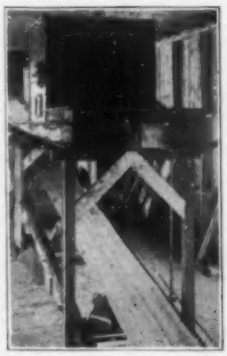
This scrubber will do the good work.

State Capacity Required!

LEWISTOWN FOUNDRY & MACHINE CO.

Mfrs. of Sand Crushing, Grinding, Washing and Drying Machinery

LEWISTOWN - - - - - - PENN.



Typical Installation

CONVEYOR WEIGHTOMETER

MERRICK CONVEYOR WEIGHTOMETERS automatically weigh and record the weight of any material being handled on any size or type of belt, bucket or pan conveyor. This method of weighing material has meant additional profits to hundreds of plants throughout the world.

MERRICK CONVEYOR SCALES accurately handle many materials. Limestone, Rock, Cement, Clinker, Gypsum, Shale, Phosphate, Coal Ores of all kinds, are only a few of them. Easy to install and adjust. Low maintenance cost because no scaleman is required.

Write for illustrated catalog showing many varied installations.

Merrick Scale Manufacturing Co.

186 Autumn Street, Passaic, New Jersey

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 21 cu. ft. to 1,000 cu. ft.

BUCKETS

1—4-yd. Hayward Class "O" clamshell.
34—Williams, Blaw Knox, Owen clamshell buckets, all sizes and types.
4—Dragline buckets: 1—Northwest 1¾-yd.; 2—Page 1½-yd.; 1—Blaw Knox 1-yd.

CARS

Large lot, including std. ga. 6 & 12-yd., & 20-yd., 36-in. ga. 5-yd. & 24-ga. 1½-yd.
16—2-yd. 36-in. ga. Continental 2-way wood body dump cars.

CRANES AND DRAGLINES

1—Koehring model 501 dragline, ser. No. 1070, 45′ boom, 1¼-yd. bucket.
1—Northwest model 104, ser. No. 2979, 45′ boom, 1¼-yd. bucket.
1—Link Belt model K-1 crane, shop No. 1024, 50′ boom, 1-yd. bucket.
1—Moore Speed crane, No. 179, 65′ boom, 1-yd. bucket.
1—Osgood heavy duty dragline, ser. No. 2069.
1—Industrial Brownhoist type CC No. 5071, 30′ boom, ½-yd. bucket.
1—Byers Bearcat crane model 26, ser. No. 20474, half circle swing, ½-yd. bucket.

SPECIAL 1—Link Belt K-55 Dragline No. 1698 —70′ boom, 2-yd. bucket.
1—Osgood combination shovel & crane, ser. no. 2069; 40′ crane boom; 20′ shovel boom; 15′ dipper sticks; ⅞ yd. dipper.

1—Erie type B-2 No. 2000 steam crane, 40′ boom, 1-yd. bucket.

CRUSHERS

1—Symons size 5½ coarse cone type No. 521.
1—Allis Chalmers size No. 6, style N; openings 12″x44″.
1—Allis Chalmers size No. 5 Gates gyratory No. 5331, openings 10″x38″.
2—McCully No. 3 gyratory crushers.
1—Climax No. 2½ jaw crusher, 10″x 20″, No. 2637.
1—Telsmith No. 9A jaw crusher, ser. No. 4139, 9″x16″.
1—Allis Chalmers smooth type crushing rolls, size 42″x16′.

DERRICKS

1—25 ton Clyde all steel Stiff Leg Derrick with 50′ boom, 30′ mast, legs & sills in proportion, 12′ dia. bullwheel, for hook work or clamshell operation.
1—15 ton Clyde, all steel Stiff Leg Derrick, 50′ boom, duplicate of above.
1—15 ton Dobbie, all steel Stiff Leg Derrick, 100′ boom, 50′ mast, legs & sills in proportion, 16′ dia. bullwheel, for hook work or clamshell operation.
1—15 ton Clyde, all steel, "A" frame, barge derrick with 50′ boom, 30′ mast, 12′ dia. bullwheel, for hook work or bucket operation.
1—10 ton Insley steel Stiff Leg Derrick, 80′ boom, 40′ mast, 16′ dia. bullwheel.
1—7½ ton Vierling, all steel Stiff Leg Derrick with 120′ boom, 40′ mast, 12′ dia. bullwheel, for hook work only.

DERRICKS (Guy)

10—American, all steelguy derrick with 115′ mast, 100′ boom, with bull wheel, for hook work or clamshell; 2—20 ton, 8—15 ton.
4—Bedford 6 ton cap., all steel guy derricks, with 90′ mast, 80′ boom, with bullwheel, for hook work or clamshell.

LOADERS

1—Barber Greene model 42-A.
1—Haiss model A.

LOCOMOTIVES

32—Gasoline locomotives, from 20 ton to 2 ton, std. ga. 36″ and 24″ ga.
1—Porter steam saddle tank locomotive, 24 ton, cyls. 12″x16″ std. ga. No. 5093.

PUMPS

4—10″ Allis Chalmers centrifugal pumps, direct connected to 200 HP, 440 V, A.C. motors; cap. 3500 GPM, 175′ head.

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50—Western 5-yd. two-way heavy duty dump cars with all steel underframes, 10′x7′x2′ deep, 2″ oak bodies, 20″ flanged wheels.
4—Milwaukee Type HLo—36″ gauge 10-ton gasoline locomotives. Serial 681, 682, 684, 689.
3—Whitcomb Type MO—36″ gauge, 12-ton gasoline locomotives, Serial 11934, 11937, 11938.
2—Buda Model 6—36″ gauge steel wheel push cars, 68x84, 1″ oak top, 4—20″ wheels.
2—Cradle dump cars, all steel, 27 cu. ft. cap.
1—Northwest Caterpillar Dragline. Serial 998—40′ boom, Model H, 4 cylinder vertical Twin City Gasoline Engine, Serial 6762 and 1 Page 1 cu. yd., dragline bucket.
1—P. & H. Crane 1737, cap. ⅝-yd. bucket, complete with equipment to convert to shovel.
1—Owen type M ⅝-yd. clamshell.
1—Size 20 Caterpillar Tractor.
1—Clamshell Bucket.
1—Sullivan 8x8 Class VK3 Portable Air Compressor on steel frame truck, 26″ dia. x 20″ air receiver arranged for belt drive.
1—I.R. 5x5½ type 20 Portable Gasoline Air Compressor on steel frame truck.
1—American Pile Driver, Serial 20923, 3000 lbs. cap.
2—Sanderson Cyclone Type 14 JR Drills, Serial 2692, 2693, with 12 H.P. upright single cylinder, gasoline engines.
2—⅝-yd. Concrete Mixers with 20 H.P. Le Roy gas engines and equip.
2—Blaw-Knox Material Bins and Charging Hoppers, all steel.
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4—O & S Concrete Carts.
6—Ransome 1001 Concrete Carts.
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1—Variety Woodworker.
50—Ton of 50-lb. rail.
Inspection and Offers Invited.
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PORTABLE AIR COMPRESSORS

1—360′ Gardner Denver. 1—210′ Sullivan.
1—220′ Sullivan. 1—220′ Ingersoll, Rand.
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Also all kinds of self-priming gasoline engine-driven Pumps.
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20″, 36″ & 42″ McCully Gyratory Crushers, 36″ Kennedy, No. 16 Telsmith and other Gyratories Nos. 3, 4, 5, 6, 7½, 8, 9 & 10.
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5′x36′ Direct Heat Revolving Dryer.
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Athey side-dump rock wagons, 14-yd.
Caterpillar "75" Diesel Tractors.
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Continuous 36″ Bucket Elevator, 60′, on belt.
Centrifugal Elec. Pump, 1000-gal., low head.
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Mundy 2-drum 15 HP. Gasoline Hoist.
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676′ Worthington Duplex Air Compressor.
Jaw Crushers: 9x16, 15x30, 24x36, 42x40, 10x30 & 5x12.
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25 Ton & 40 Ton Steam Locomotives.
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24″, 30″, 36″ Conveyor Equipment.
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1000 ft. 18 in. & 24 in. Conveyor Belts.
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10 ton Acme 3 wheel, 4 cylinder gas road roller.
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10x18 Reliance, Pulverizer Type.
7½x13, 9x16, 10x20 and 11x26 Std. Makes.
48x36, 36x18, 30x13, 15x9 and 20x6 Farrels.

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8′x22″ Hardinge Conical Pebble Mill.
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Complete Hydrating Plant.
60 ft. Guy Derrick with 60 HP Gas Hoist.
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No. 300 W Pioneer Screen, Crush & Wash Plant.
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2 P & H Shovels, Model 700—1¼ C. Y.
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In good condition and priced right.
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20 HP, 40 HP Elec. Motors.
3″ Pump with motor for 75-ft. head.
2½-yd. Green Scraper Bucket.
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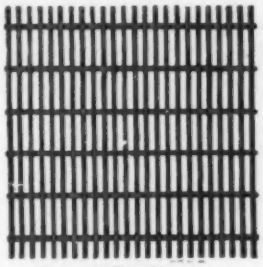

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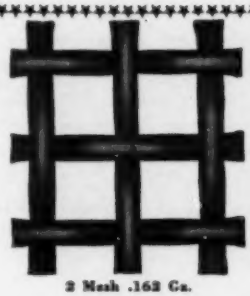

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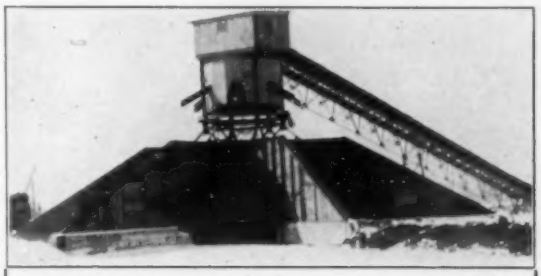

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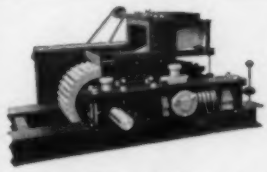

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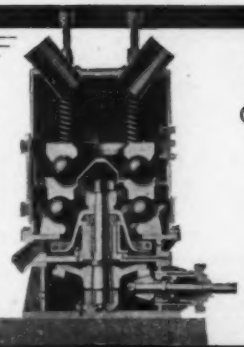

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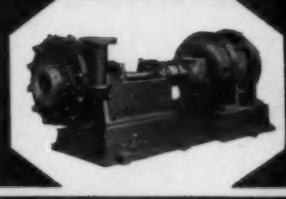

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1—4x5 and 1—7x8 American swingers.
1—40, 1—80 H.P. high pressure Firebox boilers with or without wheel mountings.

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1—14x12 Ingersoll-Rand.
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1—2030 Cu. Ft. Compressor, same specifications as above, size 24½x15½x18, driven by 450 HP Synchronous Motor.

Both machines are complete with intercoolers, after-coolers and switchboard equipment with all accessories.

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1 Besser Face down with 3000 pallets.
1 Hobbs Big Boy with pallets.
1 Anchor Power Stripper with 8x8x16—8x8x12—8x12x12 Pallets.
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1 Anchor Brick and pallets making 10 at a time.

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1-yd. P&H 600 shovel, 3500 series, overhauled 1936 at cost of $3500; bargain at $5500.
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2—⅝-yd. Koehring No. 1-C gas shovels, also 40′ crane boom, bucket.

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Model 70 Marion Steam Shovel

2½ yard bucket, excellent condition, sell cheap, can be seen at Osborn, Ohio.

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New—RAILS—Relaying

ALL SECTIONS

Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted, wire for quotations.

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Cent. Pumps (3) 2000 GPM Cameron No. 10.
Mine Loco., 4-ton, 42" ga., 250 V. Whitcomb.
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Marion & Bucyrus Electric Cat. Shovels & Draglines—1, 1¼, 1⅝ & 2½-yd. capacity.
Erie B ⅝-yd. Steam Cat. Shovel, high lift, $850.
Shovel Attachments—For most makes, ⅝-yd. and up.
Universal Truckcrane—Mounted on 6-wheel truck.
Gas Cat. Crane, ⅝-yd., full revolving, 30′ boom.
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25-ton Plymouth, gasoline-engine-driven Locomotive, standard gauge, M.C.B. equipment, excellent condition. Now in our warehouse. Inspection invited. Bargain price.

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8—310 (10x8) Ingersoll-Rand Portables.
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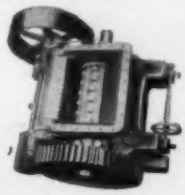

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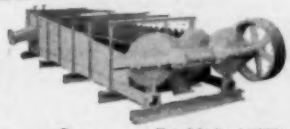

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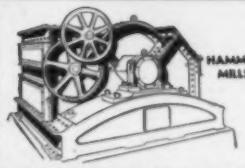

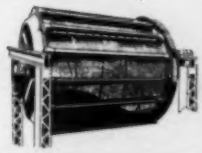

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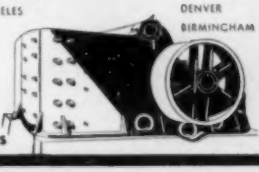

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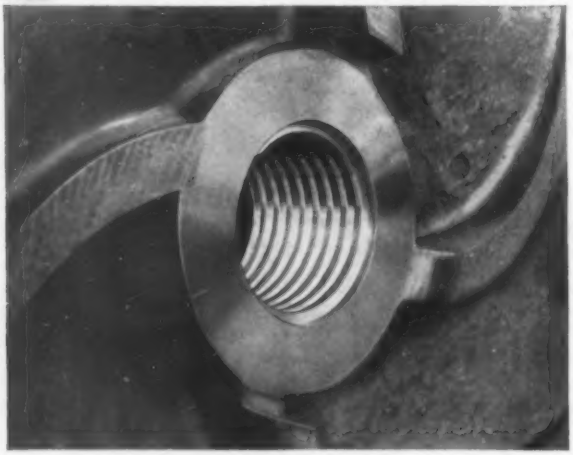

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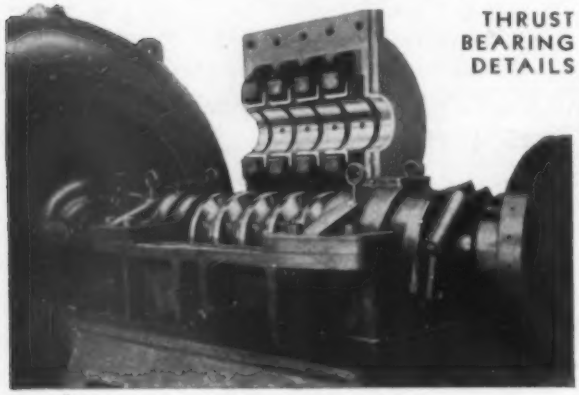

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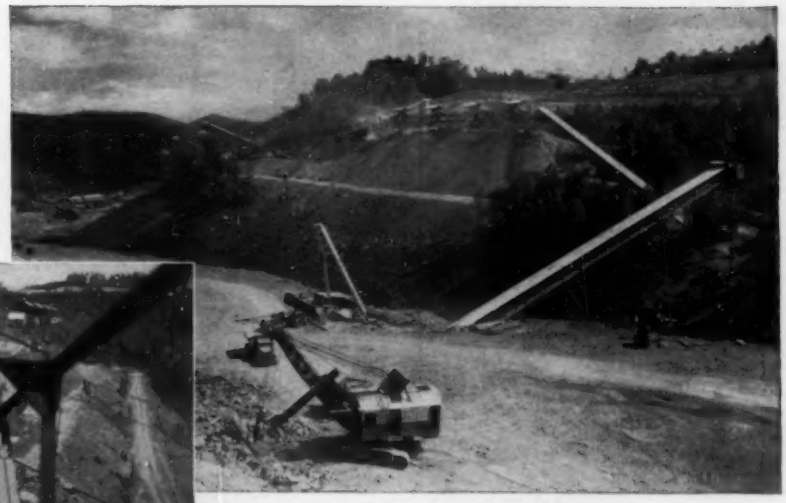

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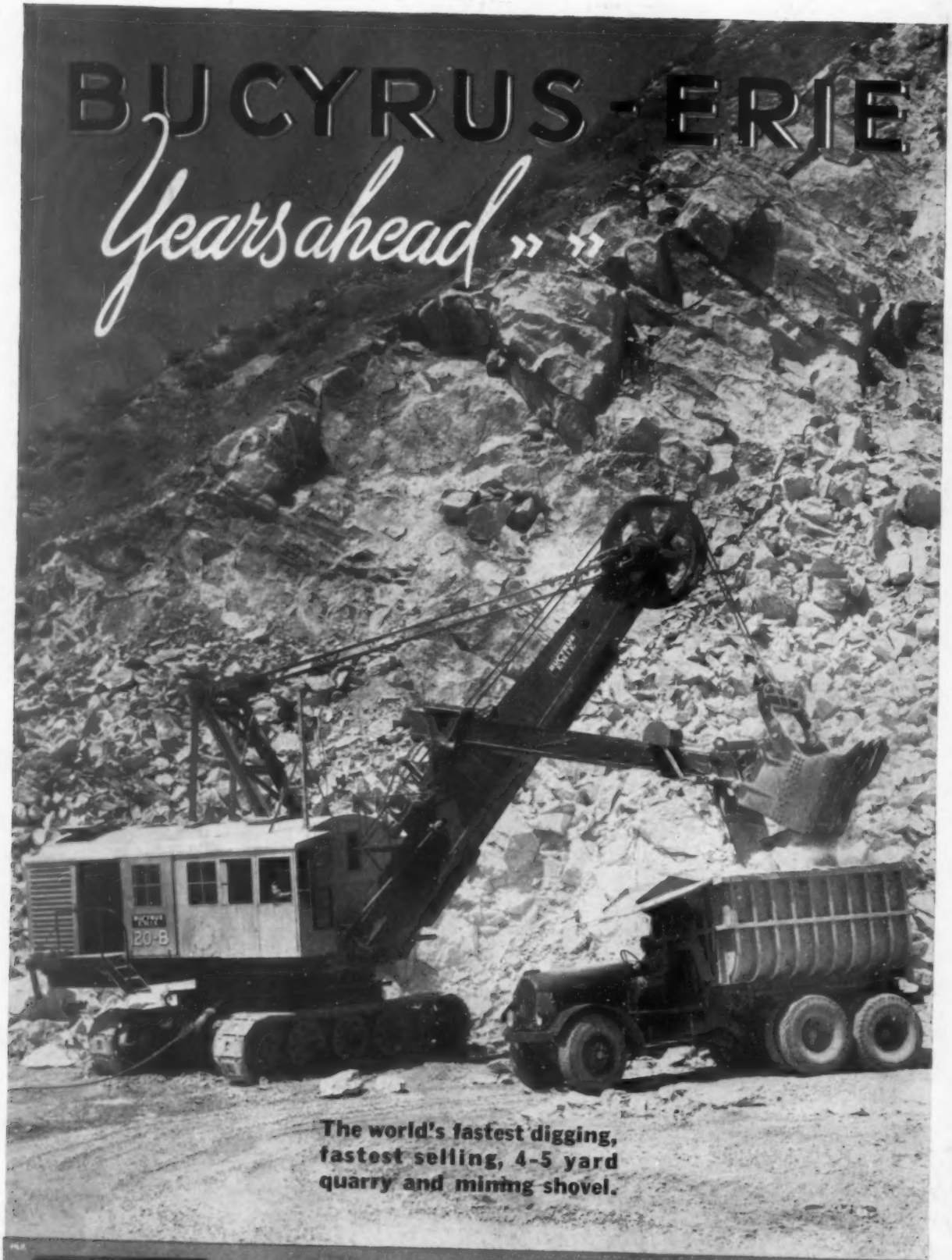

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